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REVISED 2019 SITE CHARACTERIZATION REPORT Gasoline and ULSD Releases Petro Star Refinery 1200 H&H ROAD, NORTH POLE, ALASKA

ADEC FILE: 100.38.102 HAZARD ID: 535



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Submitted To: Petro Star, Inc. 3900 C Street, Suite 802 Anchorage, Alaska 99503 Attn: Ms. Lisa Lewis

Subject: REVISED 2019 SITE CHARACTERIZATION REPORT, GASOLINE AND ULSD RELEASES PETRO STAR REFINERY, 1200 H&H ROAD, NORTH POLE, ALASKA ADEC FILE: 100.38.102 HAZARD ID: 535

Shannon & Wilson prepared this report for the exclusive use of Petro Star, Inc. and their representatives to summarize site characterization activities conducted at the Petro Star, Inc. (Petro Star) Refinery in accordance with our proposed scope of services submitted on January 21, 2019. Authorization to proceed was granted by Ms. Angela Speight on March 1, 2019. This revised report addresses comments received from the Alaska Department of Environmental Conservation (ADEC) project manager Rebekah Reams on May 1, 2020.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or we may be of further service, please contact us.

Sincerely,

SHANNON & WILSON, INC.

Andrew Frick Environmental Scientist

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AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AK	Alaska
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
°C	degrees Celsius
COC	chain of custody
CSM	conceptual site model
DRO	diesel range organics
EPA	Environmental Protection Agency
°F	degrees Fahrenheit
FSII	Fuel System Icing Inhibitor Building
GeoTek	GeoTek Alaska, Inc.
GRO	gasoline range organics
IDW	investigation-derived waste
LDRC	Laboratory Data Review Checklist
LOQ	limit of quantitation
NELAP	National Environmental Laboratory Accreditation Program
OIT	Organic Incineration Technologies, Inc.
PAH	polynuclear aromatic hydrocarbon
PAN	parcel account number
PID	photoionization detector
QA	quality assurance
QC	quality control
R	range
RPD	relative percent difference
SCWP	site characterization work plan
SGS	SGS Environmental Services, Inc.
SIM	selective ion monitoring
Т	township
TL	tax lot
ULSD	ultra-low-sulfur diesel

1 INTRODUCTION

This report summarizes the results of site characterization activities conducted from July 2019 through August 2019 at an ultra-low-sulfur diesel (ULSD) release site and a gasoline-fuel release site at the Petro Star, Inc. (Petro Star) Refinery at 1200 H&H Road in North Pole, Alaska (Figure 1). The Alaska Department of Environmental Conservation (ADEC) Contaminated Sites Database currently lists the Petro Star Refinery as a contaminated site, file number 100.38.102. The ULSD release is listed by ADEC as spill number 10309929501, and the gasoline release is listed as spill number 10309933601; Figure 2 shows the approximate release points and investigation areas.

The project objectives in 2019 were to further delineate the extent of contaminated soil and free-phase product, and to monitor groundwater quality in the vicinity of the releases. Towards these objectives, we conducted the following site-characterization activities:

- Advanced two soil borings at the ULSD-release area and completed the soil borings as monitoring wells.
- Advanced two soil borings at the gasoline-release area and completed the soil borings as monitoring wells.
- Field-screened the retrieved soil cores with a photoionization detector (PID) and collected analytical soil samples based on PID results.
- Advanced and sampled one downgradient temporary well point at each of the release areas.
- Collected analytical samples from the new and previously installed monitoring wells.
- Evaluated the groundwater flow-direction and gradient at each release area based on water level measurements collected concurrently with a horizontal and vertical survey of site wells.
- Reviewed and evaluated analytical data in the context of ADEC cleanup levels.

We conducted this work in accordance with our 2019 *Site Characterization Work Plan* dated June 2019, the ADEC August 2017 *Field Sampling Guidance* document, and Alaska Administrative Code (AAC) 18 AAC 75 *Oil and Other Hazardous Substances Pollution Control*.

2 SITE DESCRIPTION AND BACKGROUND

The Petro Star Refinery is located at 1200 H&H Road in North Pole, Alaska. The geographic coordinates of the spill site are 64.7325 degrees North, -147.3437 degrees West (Datum WGS

84). The Tanana River is approximately 0.5 miles southwest of the property. We calculated a generally northerly groundwater-flow direction at the site in September 2019, consistent with the regional groundwater-flow patterns described in the U.S. Geological Survey's *Ground-Water Levels in an Alluvial Plain Between the Tanana and Chena Rivers Near Fairbanks, Alaska 1986-93;* (p. 39).

The refinery was built in 1985 and consists of a refinery, tank farm, and loading facility on approximately 49 acres. The property spans three parcel account numbers (PAN) with the following physical descriptions: tax lot (TL)-2100 21 township (T)2S- range (R)2E (PAN 183156), TL-2103 21 T2S-R2E (PAN 183181), and TL-2106 S 21 T2S-R2E (PAN 183211). The ULSD release area (near the Fuel System Icing Inhibitor [FSII] building) and the gasoline release area (near the Return Oil Coolers) are both in the northeast quadrant of the property (Figure 2).

2.1 ULSD Release

A gasket failure near the FSII building at the refinery resulted in the release of approximately 1,400 gallons of ULSD on October 22, 2010. The spill filled a containment structure and overflowed to the adjacent ground surface. The estimated spill area was approximately 60 feet long by 12 feet wide. Initial spill-response actions and an approximately 50-cubic yard removal action were performed from October 22 through 25, 2010. Excavation extents were limited vertically and laterally to the north and west of the spill area by nearby structures, flow lines, and electrical conduits.

In December 2010 and January 2011, we installed monitoring wells *MW10-01* and *MW10-02* adjacent to the ULSD release area and *MW10-03* approximately 100 feet northwest of the release area in the anticipated downgradient groundwater flow-direction. Analytical results from the samples collected during the installation of *MW10-01* and *MW10-02* exceeded ADEC cleanup levels for diesel range organics (DRO), and subsequent groundwater samples and observation of free-phase product in the wells indicate groundwater in the immediate vicinity of the release area has been affected.

Analytical results from soil samples collected at *MW10-03* during installation, and subsequent groundwater samples collected at the well in 2011, 2013, and 2016 were below ADEC cleanup up levels. Additionally, soil borings and collocated temporary well points *SB-13-01, SB-13-02, SB-13-03,* and *SB-13-04* advanced approximately 70 feet to 150 feet north and northwest of the release area in July 2013 did not identify soil or groundwater contamination above ADEC cleanup levels.

2.2 Gasoline Release

On December 2, 2010, a split in the filter housing on the gasoline pump near the Return Oil Coolers at the refinery resulted in the release of about 230 gallons of unleaded gasoline from a 600-gallon aboveground storage tank. An initial assessment of the release area performed in December 2010 indicated an approximate 750 square feet surface extent of affected soil.

In August 2011, approximately 70 cubic yards of contaminated soil was excavated from the release area and stockpiled at the site. Field screening and analytical soil-samples we collected from the base of excavation indicated contaminated soil remained in the eastern extent of the excavation at depths between approximately 2 feet and 5.5 feet below ground surface (bgs). The excavation was limited due to a concrete slab on the eastern extent and groundwater present at approximately 6 feet bgs. We also collected soil samples from approximately 3 feet to 4 feet bgs at three test pits located approximately 10 feet to 20 feet outside of the excavation extent; analytical results from the test-pit samples were below ADEC cleanup levels.

In September 2014, we advanced and sampled seven soil borings and collocated temporary well points. Analytical sample results indicated soil contamination was present at boring *SB14-03* northwest of the 2011 excavation footprint and boring *SB14-06* advanced near the southeastern extent of the excavation footprint. Analytical groundwater results were above ADEC cleanup levels for one or more requested analytes at locations *SB14-02* and *SB14-06* within the 2011 excavation footprint, and at locations *SB14-03* and *SB14-07* located adjacent to the excavation footprint on the northwest and south, respectively. Gasoline Range Organics (GRO) and benzene, toluene, ethylbenzene, and xylenes (BTEX) were not detected above the limit of quantitation (LOQ) in groundwater samples collected at locations *SB14-01* and *SB14-04* located approximately 10 feet to 20 feet south and west of the excavation footprint, respectively. Benzene was detected at concentrations below ADEC cleanup levels in the groundwater sample collected at *SB14-05* located approximately 25 feet north of the excavation footprint.

In July 2015, we installed monitoring wells *MW15-01*, *MW15-02*, *MW15-03*, and *MW15-04* approximately 30 feet to 70 feet west to northwest of previously identified contamination in the anticipated downgradient groundwater flow-direction. Analytical results from soil samples collected during well installation and groundwater samples collected in 2015 and 2016 were below ADEC cleanup levels.

3 2019 SITE CHARACTERIZATION ACTIVITIES

In 2019, we subcontracted GeoTek Alaska, Inc. (GeoTek) to install two temporary well points, advance four soil borings, and complete the soil borings as monitoring wells. We conducted this work on July 25 and 26, 2019. Petro Star performed utility locates at the proposed explorations prior to drilling. Exploration locations installed in 2019 are summarized in Exhibit 3-1 below.

Location	Release Area	Comments
SB-19-01 / MW19-01	ULSD	Co-located soil boring and monitoring well
SB19-02 / MW19-02	ULSD	Co-located soil boring and monitoring well
TWP19-01	ULSD	Temporary well point
SB19-03 / MW19-03	Gasoline	Co-located soil boring and monitoring well
SB19-04 / MW19-04	Gasoline	Co-located soil boring and monitoring well
TWP19-02	Gasoline	Temporary well point

Exhibit 3-1: 2019 Explorations Summary

3.1 Soil Sampling

GeoTek advanced soil borings to approximately 15 feet bgs using a Geoprobe® 8040DT drill rig equipped with direct-push technology. They retrieved soil samples in continuous, 5-foot intervals with Macro Core® tooling. At each soil-boring location, we visually classified the retrieved soil cores, performed field-screening with a PID, and collected analytical soil-samples. We have included graphic logs of the soil borings in Appendix A depicting soil types, PID field-screening results, and the depths at which the analytical soil-samples were collected.

We collected up to two analytical soil-samples from each soil boring based on PID fieldscreening results. If PID results were below 20 parts-per-million at the soil boring location, we collected one sample from soil within six inches above the groundwater interface.

3.2 Monitoring Well Installation

We installed monitoring wells *MW19-01* and *MW19-02* on July 25, 2019 and *MW19-03* and *MW19-04* on July 26, 2019. The wells are constructed of 2-inch diameter, Schedule 40 PVC pipe with a 10-foot long section of 0.010-inch, machine-slotted, pre-packed well screen spanning the water table. Monitoring well construction details are presented on the boring logs in Appendix A.

We developed the new monitoring wells on August 7, 2019 using an air-diaphragm pump and collected groundwater samples with a submersible pump following development.

3.3 Groundwater Sampling

Prior to purging and sampling, we checked the monitoring wells for the presence of product using an air-oil-water interface probe. We did not detect product with the air-oil-water interface probe in any of the wells associated with our 2019 exploration activities. However, a sample was not collected from previously installed *MW10-01* and *MW10-02* related to the ULSD-release area due to a sheen being observed in both wells.

In addition to sampling the permanent monitoring wells, we also collected groundwater samples from two temporary well points; one located north to northwest of *MW19-01* in the ULSD-release area (*TWP19-01*) and one located northeast of *MW19-03* in the gasoline-release area (*TWP19-02*) on July 25, 2019. We purged and sampled the temporary well points using a peristaltic pump and new, disposable tubing.

Monitoring well and temporary well point sampling logs are included in Appendix B.

3.4 Groundwater Gradient Calculation

We subcontracted Design Alaska, Inc. to conduct a vertical and horizontal survey of site monitoring wells on September 4, 2019 and collected depth-to-water measurements concurrently with the survey. We used the data to calculate the groundwater gradient of the ULSD- and gasoline-release areas using the hydraulic gradient calculator available at the Environmental Protection Agency's (EPA) *On-line Tools for Site Assessment Calculation* website. The results of the calculation indicate a groundwater flow-direction that is generally north with high statistical significance (coefficient of variation close to one) for both release areas. Exhibit 3-2 summarizes the groundwater gradient calculation results. Survey and water level data are included in Appendix C.

Area	Number of Wells Used in Calculation	Gradient Magnitude	Groundwater Flow- Direction (degrees clockwise from north)	Coefficient of Determination
ULSD-Release	5	0.00116	352.9	0.971
Gasoline-Release	6	0.00135	347.0	0.940
Entire Site	11	0.00122	355.8	0.995

Exhibit 3-2: Groundwater Gradient Calculation Summary

3.5 Product Recovery Operations

Petro Star personnel attempt to recover product with a peristaltic pump weekly at wells *MW10-01, MW10-02,* and *MW10-03* at the ULSD release area. Product has not been observed in the monitoring wells installed for the gasoline release. Petro Star disposes the recovered product through their onsite oil-water separator. Exhibit 3-3 summarizes product recovery volumes at Petro Star since 2011.

	Prod	uct Recovery Volume (gallons)		
Year ¹	MW10-01	MW10-02	MW10-03		
2011 ²	Not reported	9.90	Not reported		
2012 ³	0.19	12.85			
2013		7.43			
2014	1.06	22.40			
2015	0.11	1.60			
2016	2.55	4.41			
2017	0.05	1.75			
2018	0.31	8.18			
2019	0.17	1.86			
Total	4.44	70.38	0.00		
		74.82			

Exhibit 3-3: Summary of Manual Product Recovery

NOTES:

1 Weekly product recovery reports by Petro Star personnel consolidated into yearly totals.

2 Only data for January through September was reported.

3 Data from months prior to June were not reported for all three monitoring wells.

-- No recoverable product or unquantifiable trace amounts of recoverable product.

4 INVESTIGATION-DERIVED WASTE MANAGEMENT

Purge water from monitoring well development and sampling activities was disposed via the onsite water treatment system. Soil-core material not selected for laboratory analysis was temporarily stored at the site in a clamp-top, 55-gallon drum pending ADEC approval for transport and disposal. After receiving ADEC approval, we transported the soil to the NRC Alaska Thermal Treatment Facility (also known as Organic Incineration Technologies, Inc. [OIT]) in Moose Creek, Alaska for thermal treatment. Other investigation-derived waste (IDW) such as nitrile gloves, pump tubing, and soil-boring sleeves were disposed at the Fairbanks North Star Borough landfill.

5 ANALYTICAL RESULTS

We submitted soil and groundwater analytical samples to SGS North America, Inc. (SGS), an ADEC-approved analytical laboratory with National Environmental Laboratory Accreditation Program (NELAP) certification. We requested laboratory analysis of GRO by Alaska (AK) method 101; DRO by AK method 102; benzene, toluene, ethylbenzene, and xylenes (BTEX) with naphthalene by method EPA 8260; and polyaromatic hydrocarbons (PAH) by method EPA 8270 with selective ion monitoring (SIM). Samples were collected for GRO, DRO, BTEX, and PAHs at the ULSD-release area with a request for PAH analysis at a frequency of 1 of every 10 samples for each matrix sampled. Samples were collected for GRO, BTEX, and naphthalene at the gasoline-release area per Table 2A of the ADEC's 2017 *Underground Storage Tanks Procedures Manual*.

To evaluate analytical data, we compared soil-sample analytical results to migration-togroundwater cleanup levels for the "Under 40 Inch Zone" listed in 18 AAC 75.341[c] and [d] and compared groundwater-sample analytical results to the human health cleanup levels listed in 18 AAC 75.345.

5.1 Analytical Groundwater-Sample Results

5.1.1 ULSD Release

Analytical groundwater-sample results indicated one or more analytes were present in groundwater at concentrations above the applicable ADEC cleanup levels in *MW19-01* and *TWP19-01* at the ULSD-release area. Tabulated analytical groundwater-sample results are presented in Table 1 and are summarized in Figure 3.

5.1.2 Gasoline Release

Analytical groundwater-sample results indicated one or more analytes were present in groundwater at concentrations above the applicable ADEC cleanup levels in *MW19-03* at the gasoline-release area. Tabulated analytical groundwater-sample results are presented in Table 1 and are summarized in Figure 5.

5.2 Analytical Soil-Sample Results

5.2.1 ULSD Release

Analytical soil-sample results indicated one or more analytes were present in soil at concentrations above ADEC cleanup levels at product-delineation soil borings *SB-19-01-7.5*

at the ULSD-release area. Tabulated analytical soil-sample results are presented in Table 2 and are summarized in Figure 4.

5.2.2 Gasoline Release

Analytical soil-sample results indicated one or more analytes were present in soil at concentrations above ADEC cleanup levels at product-delineation soil borings *SB-19-03-6.5* and *SB-19-03-7.5*. Tabulated analytical soil-sample results are presented in Table 2 and are summarized in Figure 6.

6 QUALITY ASSURANCE/ QUALITY CONTROL

We reviewed the analytical results provided by SGS for laboratory quality control (QC) samples and also conducted our own quality assurance (QA) assessment for this project. We reviewed chain of custody (COC) records and laboratory sample-receipt forms to check that we followed proper custody procedures, met sample-holding times, and kept samples properly chilled during shipping. Our QA-review procedures allow us to document accuracy and precision of the analytical data and check that the analyses were sufficiently sensitive to detect analytes at levels below regulatory standards.

6.1 Field QA/QC

We collected field duplicate samples and equipment blank samples at the frequencies prescribed by the ADEC *Field Sampling Guidance*. We stored samples in a cooler chilled with artificial ice and accompanied by a temperature blank and a trip blank for volatile organic analyses. Temperature blanks and cooler temperatures were within the recommended range of 0 °C to 6 °C upon receipt of samples at the SGS Fairbanks receiving office and the Anchorage laboratory.

6.2 Analytical Data Review

For this report, we reviewed the soil data reported in SGS work orders 1199566, 1199567, and 1199616. The SGS laboratory report contains the case narrative, sample-receipt forms, analytical results, and a copy of the COC. Our review of the data reveals that some of the analytical samples experienced method and laboratory data-quality failures (insufficient analytical method sensitivities, surrogate recovery failures, field duplicate relative percent difference (RPD) failures, etc.). Details regarding the results of our QA analyses are presented in the ADEC laboratory data-review checklists along with copies of the original SGS laboratory reports (Appendix D).

Field duplicate samples were submitted at a frequency of 10-percent of total samples except a field duplicate sample was not submitted for the DRO and PAH analyses for soil samples collected at the ULSD-release area nor naphthalene for the temporary well point sample at the gasoline-release area. The omission of field duplicate data for the analysis of these analytes constitutes a work deviation and the reproducibility of sampling methodology cannot be assessed.

We consider the analytical results reported by SGS to be acceptable and representative for assessing site conditions at the time and locations they were collected. Analytical results that are considered affected by method and laboratory data-quality failures are flagged in the attached analytical results tables.

7 UPDATED CONCEPTUAL SITE MODEL

We completed an ADEC human health conceptual site model (CSM) scoping form and graphic form for the site based on our current understanding of site conditions (Appendix E). Separate CSMs have been created to assist the formulation of area-specific recommendations like institutional controls. The following is a summary of the CSMs and the transport mechanisms, exposure media, exposure pathways, and potential receptors they describe.

7.1 Description of Potential Receptors

We consider workers (commercial/ industrial/ construction), site visitors, and trespassers to be current or future potential receptors on the secure Petro Star Refinery property. We do not consider residents, recreational users, farmers, or subsistence harvesters and consumers to be potential receptors at present.

7.2 Potential Exposure Pathways

Potential human exposure pathways include direct contact with contaminated soil, groundwater, or air; incidental soil or groundwater ingestion; dermal absorption of contaminants in soil or groundwater; and inhalation of outdoor air.

7.2.1 Direct Contact with Soil

Dermal absorption and incidental ingestion are potential direct-contact exposure pathways for soil. Surface soil may be a directly affected medium at the site. Previous investigations indicate subsurface soil (2 feet to 15 feet bgs) is a directly affected medium. Direct contact with the contaminated subsurface soil at the site is unlikely at present. However, future excavation at the site may result in dermal contact or ingestion of soil by commercial/industrial workers, site visitors, trespassers, or construction workers.

7.2.2 Direct Contact with Groundwater

Dissolved-phase contaminants have been identified in groundwater at the site. Free-phase product has also been observed in the monitoring wells at the ULSD-release area. Exposure to groundwater or product may occur during excavation activities, such as construction. We consider dermal absorption of contaminants in groundwater/product a complete exposure pathway for current and future site receptors.

Affected groundwater is not a current drinking source; however, ADEC has not determined the groundwater is not a future source of drinking water according to 18 AAC 75.350. The refinery and nearby properties are connected to the City of North Pole water supply. Ingestion of groundwater is considered a complete exposure pathway for future site receptors, however, use of affected groundwater for drinking water purposes is not likely.

7.2.3 Inhalation of Outdoor Air

We consider inhalation of outdoor air to be a complete pathway for current and future site receptors. Volatile contaminants have been identified in soil between 0 feet and 15 feet bgs at both release areas. Contaminants are expected to dissipate in outdoor air.

8 DISCUSSION

Below we discuss the site closure criteria outlined in the January 2020 *ADEC Site Closure/Cleanup Complete* memorandum in the context of our current understanding of site conditions. The site closure memorandum indicates the following excerpted criteria (italics) must at a minimum be met for site closure with or without institutional controls. We have omitted multiple other criteria listed in the memorandum and present the following discussion merely to illustrate preliminary goals necessary to meet site closure. Following each excerpt, we discuss our current understanding of site conditions as it relates to the closure determination criteria.

The extent of hazardous substance contamination must be properly characterized (18 AAC 75.335. Site characterization) and/or adequate characterization of the horizontal and vertical extent of petroleum contamination in soil, groundwater, and surface water (18 AAC 78.235. Release investigation);

The extent of petroleum contamination in soil and groundwater north-to-northeast of the ULSD-release area has not been delineated (Figures 3 and 4). Also, contamination was left unexcavated during the 2010 corrective actions to address the ULSD release due to the presence of refinery infrastructure; the extent of the source area has not been delineated. The extent of contamination at the gasoline-release area has been delineated (Figures 5 and 6).

Free product must be recovered to the maximum extent practicable (18 AAC 75.325(f)(l)(B) and 18 AAC 78.240(b));

Product recovery operations are successfully recovering product from wells *MW10-01* and *MW10-02* at the ULSD-release area. Free-phase product has not been observed at the gasoline release area.

Surface soil staining must be evaluated and cleaned up to the maximum extent practicable (18 AAC 75.325(f)(l)(E));

We have not observed surface-soil staining during our site-characterization activities. We consider this requirement fulfilled.

The maximum allowable petroleum (GRO, DRO, RRO) cleanup levels for soil must be achieved unless the responsible party has demonstrated the contaminants will not migrate and will not pose an unacceptable risk to human health or the environment; and

Analytical soil sample results did not exceed the maximum allowable concentrations (MACs) for DRO or GRO in the samples collected in 2020. However, samples collected from the extent of excavation at the ULSD release area in 2010 following initial corrective actions did exceed the MACs for DRO.

There are no unacceptable risks to sensitive subpopulations, if present.

Based on our current understanding, sensitive subpopulations do not use or occupy the site in a manner that will lead to unacceptable risk. We consider this requirement fulfilled.

9 CONCLUSIONS AND RECOMMENDATIONS

In our opinion, the site-closure criteria discussed above have been achieved for the gasolinerelease area. Below we propose recommendations for addressing remaining data gaps for the ULSD-release area. In addition to the explorations proposed below, we also recommend continuing annual groundwater sampling at both the ULSD- and gasoline-release areas to evaluate groundwater-contaminant concentration trends.

9.1 Free-Phase Product Delineation

The horizontal extent of free-phase product at the ULSD-release area has been effectively delineated. Product was observed in monitoring wells *MW10-01* and *MW10-02* in August 2019, but petroleum analytes were not detected in groundwater samples from the nearby *MW19-02* monitoring well. This suggests the product plume likely does not extend to the southwest beyond the vicinity of *MW10-01* and *MW10-02*. Additionally, product was not observed at locations *MW10-03*, *MW19-01*, or *TWP19-01* located north to northeast of the ULSD release area.

We recommend checking monitoring well *MW19-01* quarterly for the presence of product and incorporating the well into the product recovery program if product is observed. We also recommend removing *MW10-03* from the product recovery program or decreasing the frequency of product recovery visits to the well because recoverable product has not been observed during current or previous investigations.

9.2 Contaminated Soil and Groundwater Delineation

In our opinion, the extent of contaminated soil and groundwater at the ULSD-release area have not been fully delineated. The presence of benzene at concentrations above ADEC groundwater cleanup levels at *TWP19-01* sampled in August 2019 suggests that groundwater contamination may extend north from the ULSD-release point in the direction of the calculated groundwater gradient. We recommend installing and sampling a temporary well point north of *TWP19-01* to further investigate the extent of contaminated groundwater downgradient of the ULSD-release area. We also recommend advancing and sampling a soil boring and temporary well point to the northeast of *MW19-01* to delineate subsurface contamination to the northeast of the USLD release area.

10 LIMITATIONS

Our interpretations, conclusions, and recommendations are based on:

- The limitations of our approved scope, schedule, and budget described in our January 21, 2019 proposal.
- Our understanding of the project and information provided by Petro Star, Inc.

- Site and subsurface conditions we observed during our site investigation as they existed during the study period.
- The results of testing performed on samples we collected from site explorations.

The explorations were performed to evaluate environmental conditions at the site. This report should not be used for other purposes without Shannon & Wilson's review. Our observations are specific to the locations, depths, and times at which they were collected and may not be applicable to all areas of the site. No amount of testing can precisely predict the characteristics, quality, or distribution of subsurface and site conditions. Potential variations include, but are not limited to:

- The conditions between and below explorations may be different.
- The passage of time or intervening causes (natural and manmade) may result in changes to site and subsurface conditions.
- Groundwater levels and flow-directions may fluctuate due to seasonal and recharge source variations.
- Groundwater flow between different aquifers can occur. No soil layer should be assumed to be continuous and/or water-tight.
- Surface conditions may be different because the areas of the site were covered with snow, vegetation, etc. such that we could not observe conditions in those areas.
- Contaminant concentrations may change in response to natural conditions, chemical reactions, and/or other events.
- The presence, distribution, and concentration of contaminants may vary from our sampling locations. Our tests may not represent the highest contaminant concentrations at the site.

If conditions different from those described herein are encountered during future work at the site, we should review our description of the subsurface conditions and reconsider our conclusions and recommendations. The opinions, recommendations, and conclusions contained in this report are valid for a period not greater than six months from the date of this report. This time limitation is included in recognition that the site conditions can and do change with time. We have prepared the document *"Important Information About Your Geotechnical/Environmental Report"* to assist you and others in understanding the use and limitations of this report. Please read this document to learn how you can lower your risks for this project.

Our scope of services did not include:

• Evaluating the presence of cultural resources or hazardous materials at or around the site.

- Removing wells that we installed at the site. It is the Owner's responsibility to properly
 decommission subsurface installations in accordance with State of Alaska regulations
 when use of the wells are no longer needed.
- Evaluating the presence of contaminants or naturally occurring materials, other than those for which our analyses were performed.

If a service is not specifically indicated in this report, do not assume that it was performed.

This report should not be used without our approval if any of the following occurs:

- Conditions change due to natural forces or human activity under, at, or adjacent to the site.
- Assumptions stated in this report have changed.
- Project details change or new information becomes available such that our assessment, evaluations, analyses, studies, conclusions, and/or recommendations may be affected.
- If the site ownership or land use has changed.
- More than six months have passed since the date of this report.
- Regulations, laws, or cleanup levels change.
- If the site's regulatory status has changed.

If any of these occur, we should be retained to review the applicability of our interpretations, conclusions, and recommendations.

State and/or federal agencies may require reporting of the information included in this report. Shannon & Wilson does not assume the responsibility for reporting these findings and therefore has not, and will not, disclose the results of this study unless specifically requested and authorized by Petro Star, Inc. or as required by law. Please contact us to discuss reporting requirements. Regulatory agencies may reach different conclusions than Shannon & Wilson.

11 REFERENCES

Alaska Administrative Code 18 AAC 75 *Oil and Other Hazardous Substances Pollution Control,* October 2018.

ADEC Field Sampling Guidance, August 2017.

ADEC Site Closure / Cleanup Complete Memorandum, August 2016.

EPA Static Sheen Test (Method 1617), 40 CFR Part 435, Subpart A, Appendix 1.

EPA On-line Tools for Site Assessment Calculation, available at: https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/gradient4plus-ns.html

<u>United States Geological Survey</u> *Ground-Water Levels in an Alluvial Plain Between the Tanana and Chena Rivers Near Fairbanks, Alaska 1986-93, 1996.*















Table 1 - 2019 Analytical Groundwater-Sample Results

Analytical		Cleanun															
Method	Analyte	Level	Units	MW10-03	MW15-1	MW15-2	MW15-3	MW15-4	MW19-01	MW19-101	MW19-02	MW19-03	MW19-103	MW19-04	TWP19-01	TWP19-101	TWP19-02
AK101	Gasoline Range Organics	2.2	mg/L	<0.0500	<0.0500	0.0332J	<0.0500	<0.100B*	1.13	1.20	<0.0500	224	222	<0.0500	0.0767J	0.0850J	0.0956J
AK102	Diesel Range Organics	1.5	mg/L	<0.283	_	_	_	_	1.16J*	2.88J*	<0.294	_	_	_	1.37J*	0.819J*	_
	Benzene 4.6		µg/L	<0.200	<0.200	<0.200	<0.200	<0.400B*	<3.13B*	<3.11B*	<0.200	1260	1300	<0.200	22.6	23.5	0.270J
	Ethylbenzene	15	µg/L	<0.500	<0.500	< 0.500	<0.500	<1.00B*	31.4	31.0	<0.500	4760	5000	<0.500	0.400J	0.410J	<0.500
	Naphthalene	1.7	µg/L	_	< 0.500	< 0.500	<0.500	<0.500	_	—	—	66.0J	<100	<0.500	—	—	<0.500
SW8260C	o-Xylene	100 total	µg/L	<0.500	< 0.500	< 0.500	<0.500	<1.04B*	52.1	51.8	<0.500	6970	7270	<0.500	<0.500	<0.500	<0.500
	p & m -Xylenes	- 170 lolai	µg/L	<1.00	<1.00	<1.00	<1.00	<2.17B*	87.3	85.9	<1.00	15300	16000	<1.00	<1.00	<1.00	1.28J
	Toluene	1100	µg/L	<0.500	< 0.500	0.541J	0.410J	<13.0B*	189JH*	194JH*	<0.500	78800	82100	<1.00B*	< 0.500	< 0.500	<0.500
	Total Xylenes	190	µg/L	<1.50	<1.50	<1.50	<1.50	<3.21B*	139	138	<1.50	22300	23200	<1.50	<1.50	<1.50	1.28J
	1-Methylnaphthalene	11	µg/L	—	_	—	—	-	29.2	25.1	—	—	—	—	<0.0236	<0.0245	—
	2-Methylnaphthalene	36	µg/L	—	_	_	—	—	26.5	23.1	—	—	—	—	<0.0236	<0.0245	—
	Acenaphthene	530	µg/L	_	_	_	_	_	0.297	0.268	_	_	_	_	0.0884	0.0804	_
	Acenaphthylene	260	µg/L	—	_	—	—	—	<0.0236	0.127	—	—	—	—	<0.0236	<0.0245	—
	Anthracene	43	µg/L	—	_	—	—	—	<0.0236	<0.0240	—	—	—	—	<0.0236	<0.0245	—
	Benzo(a)anthracene	0.3	µg/L	—	_	—	—	—	<0.0236	<0.0240	—	—	—	—	<0.0236	<0.0245	—
	Benzo(a)pyrene	0.25	µg/L	_	—	_	_	—	< 0.00945	<0.00960	—	_	—	—	<0.00945	<0.00980	_
	Benzo(b)fluoranthene	2.5	µg/L	_	_	_	_	_	<0.0236	<0.0240	_	_	_	_	<0.0236	<0.0245	_
8270D SIM I V	Benzo(g,h,i)perylene	0.26	µg/L	—	_	—	—	—	<0.0236	<0.0240	—	—	—	—	<0.0236	<0.0245	—
	Benzo(k)fluoranthene	0.8	µg/L	—	_	—	—	—	<0.0236	<0.0240	—	—	—	—	<0.0236	<0.0245	_
	Chrysene	2	µg/L	—	_	—	—	—	<0.0236	<0.0240	—	—	—	—	<0.0236	<0.0245	_
	Dibenzo(a,h)anthracene	0.25	µg/L	_	—	_	_	—	< 0.00945	<0.00960	—	_	—	—	<0.00945	<0.00980	_
	Fluoranthene	260	µg/L	_	_	_	_	_	<0.0236	<0.0240	_	_	_	_	< 0.0236	<0.0245	—
	Fluorene	290	µg/L	_	_	_	_	_	1.15	1.05	_	_	_	_	0.326	0.302	_
	Indeno(1,2,3-cd)pyrene	0.19	µg/L	_	_	_	_	_	<0.0236	<0.0240	_	_	_	_	<0.0236	<0.0245	_
	Naphthalene	1.7	µg/L	_	_	_	_	-	24.6	21.2	—	_	_	_	<0.0471	<0.0490	_
	Phenanthrene	170	µg/L	_		_		_	0.385	0.351	_	_	_	_	<0.0236	<0.0245	_
	Pyrene	120	µg/L	_	_	_	_	_	<0.0236	<0.0240	_	_	_	_	<0.0236	<0.0245	_

NOTES:

Sample MW19-101 is a field duplicate of M19-01.

Sample TWP19-101 is a field duplicate of TWP19-01.

Analytical results reported from SGS North America laboratory report 1199566 and 1199616.

ADEC Groundwater Cleanup Levels from 18 AAC 75.341 Table C - Groundwater Human Health Cleanup Level.

ADEC Alaska Department of Environmental Conservation

mg/L milligrams per liter

µg/L micrograms per liter

< Analyte was not detected; reported as less than the limit of detection (<LOD).

J Estimated concentration, detected greater than the detection limit (DL) and less than the limit of quantitation (LOQ). Flag applied by the laboratory.

J* Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc.

Gasoline and ULSD Releases Petro Star Refinery 2019 Site Characterization Report

Table 1 - 2019 Analytical Groundwater-Sample Results

Analytical		Cleanup											
Method	Analyte	Level	Units	MW10-03	MW15-1	MW15-2	MW15-3	MW15-4	MW19-01	MW19-101	MW19-02	MW19-03	MW19-103
JH*	Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson, Inc.												
B*	Result is considered not detected due to qualit	ty control failures; s	ee checklist	for details. Flag	g applied by S	hannon & Wils	on, Inc.						
Bold	Detected concentration exceeds the associated ADEC groundwater cleanup level.												
_	Analysis not requested.	Analysis not requested.											

Gasoline and ULSD Releases Petro Star Refinery 2019 Site Characterization Report

MW19-04 TWP19-01 TWP19-101 TWP19-02

2019 GW Analytical Results.xlsx - 1/23/2020

Table 2 - 2019 Analytical Soil-Sample Results

		Cleanup	11.21.							
Analytical Method	Analyte	Level	Units	SB-19-01-5	SB-19-01-7.5	SB-19-02-4.5	SB-19-03-6.5	SB-19-103-6.5	SB-19-03-7.5	SB-19-04-4
AK101	Gasoline Range Organics	300	mg/kg	<1.24	36.8JH*	2.11J	413JH*	468JH*	491JH*	<0.745
AK102	Diesel Range Organics	250	mg/kg	<24.2B*	1830	<12.7	-		_	_
	Benzene	0.022	mg/kg	<0.00620	<0.0109	<0.0109	0.411	0.481J	0.781	<0.00373
	Ethylbenzene	0.13	mg/kg	< 0.0124	0.0443	0.0443	19.5	25.7	28.0	< 0.00745
	Naphthalene	0.038	mg/kg	_	—	—	<0.321	<0.381	<0.170	<0.00745
SW8260C	o-Xylene	– 15 total	mg/kg	<0.0124	0.0845	0.0845	27.3	34.8	30.8	< 0.00745
	p & m -Xylenes	1.5 เป็นไ	mg/kg	< 0.0247	0.210	0.210	64.0	83.5	68.7	< 0.0149
	Toluene	6.7	mg/kg	0.00824J	0.0169J	0.0169J	76.2	102	116	<0.00745
	Total Xylenes	1.5	mg/kg	<0.0371	0.295	0.295	91.4	118	99.5	<0.0224
	1-Methylnaphthalene	0.41	mg/kg	_	4.49	_	_	_	_	_
	2-Methylnaphthalene	1.3	mg/kg	_	5.25	_	_	_	_	_
	Acenaphthene	37	mg/kg	_	< 0.0140	_	_	_	_	_
	Acenaphthylene	18	mg/kg	_	< 0.0140	_	_	_	_	_
	Anthracene	390	mg/kg	_	< 0.0140	_	_	_	_	_
	Benzo(a)anthracene	0.28	mg/kg	_	< 0.0140	_	_	_	_	_
	Benzo(a)pyrene	0.27	mg/kg	_	<0.0140	_	_	_	_	_
	Benzo(b)fluoranthene	2.7	mg/kg	_	< 0.0140	_	_	_	_	_
	Benzo(g,h,i)perylene	15000	mg/kg	_	< 0.0140	_	_	_	_	_
0270D SIIVI LV	Benzo(k)fluoranthene	27	mg/kg	_	<0.0140	_	_	_	_	_
	Chrysene	82	mg/kg	_	< 0.0140	_	_	_	_	_
	Dibenzo(a,h)anthracene	0.87	mg/kg	_	< 0.0140	_	_	_	_	_
	Fluoranthene	590	mg/kg	_	< 0.0140	_	_	_	_	_
	Fluorene	36	mg/kg	_	0.452	_	_	_	_	_
	Indeno(1,2,3-cd)pyrene	8.8	mg/kg	_	< 0.0140	_	_	_	_	_
	Naphthalene	0.038	mg/kg	_	1.17	_		_	_	_
	Phenanthrene	39	mg/kg	_	0.422	_	_	_	_	_
	Pyrene	87	mg/kg	_	0.00801J	_	_	_	_	_

NOTES:

Sample SB-19-03-6.5 is a field duplicate of SB-19-103-6.5.

Analytical results reported from SGS North America laboratory report 1199567.

ADEC Cleanup Levels for Soil samples were obtained from 18 AAC 75.340 Table B1. Method Two - Migration to Groundwater and Table B2. Method Two - Under 40 Inch Zone - Migration to Groundwate

ADEC Alaska Department of Environmental Conservation

mg/kg milligrams per kilogram

< Analyte was not detected; reported as less than the limit of detection (<LOD).

J Estimated concentration, detected greater than the detection limit (DL) and less than the limit of quantitation (LOQ). Flag applied by the laboratory.

JH* Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson, Inc.

B* Result is considered not detected due to quality control failures; see checklist for details. Flag applied by Shannon & Wilson, Inc.

Bold Detected concentration exceeds the associated ADEC **soil** cleanup level.

Analysis not requested.

Gasoline and ULSD Releases Petro Star Refinery 2019 Site Characterization Report

Appendix A Boring Logs and Monitoring Well Construction Details

					LC	G OF GEOP	ROB	E						
Date	Started		7/25/19	Location	Petrostar North Pe	ole Refinery		Grou	Ind E	Elev	vation:	Unknow		
Date	Comple	eted	7/25/19			-	Γ	Турі	cal R	Run	Lengt	h <i>5 feet</i>		
Total	Depth	(ft)	15.0	Drilling C	Company: GeoTek A	Alaska		Hole	Diar	me	ter:	3.75 inch	ies	
Depth (ft)	Probe Run	Refer and ap	to the repoi probing met proximate b different	S rt text for a p thods. The s oundaries be if soil shifted	Depth, ft.	Symbol		ruu, ppm	Well Construction	Sample Desc and F	Number, ription, Results	Depth (ft)		
	G	Bro (GF thro *No	wn to gray P- <i>GM</i>); moi bughout; pe te: hole wa	, Poorly Gra st to 4.8 fe stroleum oc	aded Gravel With S et bgs then wet; co dor present at 7.0 f to 6 feet bgs with v	Silt and Sand barse gravel ieet bgs. vacuum-trailer.	15.0		7 1 1 <td>.3 .9 .9 .3 .4 .3 .2 .3 .3 .4 .3 .3 .4 .3 .3 .4 .3 .3 .4 .3 .3 .4 .3 .3 .3 .3 .4 .3 .4 .4 .3 .4 .4 .3 .4 .4 .5 .6 .7 <td></td><td>SB-19-01-5 SB-19-01-7.5</td><td></td><td></td></td>	.3 .9 .9 .3 .4 .3 .2 .3 .3 .4 .3 .3 .4 .3 .3 .4 .3 .3 .4 .3 .3 .4 .3 .3 .3 .3 .4 .3 .4 .4 .3 .4 .4 .3 .4 .4 .5 .6 .7 <td></td> <td>SB-19-01-5 SB-19-01-7.5</td> <td></td> <td></td>		SB-19-01-5 SB-19-01-7.5		
- - - - - - - - - - - - - - - - - - -		Bo Flus Top 2-in Slot Tota	ring and m nitoring we sh-mounte o of casing ch-diamete t Size: 0.0' tted Interva al depth of	In details: Il details: d monume is 0.5 feet er riser pipe 10 inches al: 2.4-12.0 well: 12.4	vell, MW19-01, cor Int bgs e feet bgs feet bgs	npleted July 25, 2019.								20
				<u>NO</u>	DTES							·		
1. l r	n some o nay have	cases w e slid do	here recove	ry was low in be prior to re	the upper part of the moval from the ground	run, the soil sample d.								
2. (c 3. f	Groundw considere Refer to I	ater lev ed appro KEY for	el, if indicate oximate.	ed above, was	s estimated during pro	bbing and should be			Petr	ro I	Star N North I	orth Pole Re Pole, Alaska	efinery 1	
4. (s	CT = corr sample; (rosion t GE = ge	est sample; eotechnical s	TR = thermal ample; AR = <u>LEG</u>	I resistivity sample; EN archeological sample. END	V = environmental	LC	CG	OF	= (GEO	PROBE	SB-19-0	1
	2" Plas 2" Plas	stic Tut stic Tut	be - No Soil be with Soil	Recovery Recovery	⊡⊡ Piezomete	r Screen and Sand Filter ter Level ATD	July	201	9				1017	52
	- ĸun N	υ.					SHANNON & WILSON, INC. Geotechnical and Environmental Consultants Figure 1							1

				LOG OF GEO	PRO	OBE													
Date	Started	7/25/19	Petrostar North Pole Refinery		Ģ	Groun	d Ele	evation:	Unknow	n									
Date	Comple	eted 7/25/19	1							Typical Run Length 5 feet									
Total	Depth	(ft) 15.0	Drilling C	Drilling Company: GeoTek Alaska						3.75 inch	ies								
Depth (ft)	Probe Run	Refer to the repo and probing me approximate b different	t text for a p thods. The s oundaries be if soil shifted	ials he ?	Jepth, ft.	symbol	ND, ppm	Nell Construction	Sample Desci and F	Number, iption, esults	Depth (ft)								
		Brown, <i>Poorly</i> subangular to Brown, <i>Silty S</i> (<i>ML</i>) to <i>Silt (M</i>	Graded Gr subrounde and (SM) w L); wet at 4	ravel with Silt and Sand (GP-GM); mois ed. with interbeded layers of Silt with Sand 8.8 feet bgs.	t,	2.3		4.3											
		Brown, <i>Poorly</i> subangular to	Graded Gr subrounde	aded Gravel with Silt and Sand (GP-GM); wet, brounded.		6.6		3.9 3.7 3.9 3.9 2.7 4.4	During Drilling House	SB-19-02-4.5		5							
 15 		Brown, <i>Poorly</i> subrounded. Boring and	Graded Gr	<i>avel With Sand</i> ; wet, subangular to well, MW19-02, completed on July 25 2019.		13.4 15.0		4.8 4.2 4.6											
20 20 		Monitoring we Flush-mounte Top of casing 2-inch-diamet Slot Size: 0.0 ⁷ Slotted Interva Total depth of	Il details: d monume is 0.4 feet er riser pip 10 inches al: 3.2-12.7 well: 13.2	nt bgs e feet bgs bgs								20							
- 1. 7 2. (3. 4. /	In some of may have Groundw considere Refer to I CT = corr	cases where recove solid down in the tu vater level, if indicate ed approximate. KEY for definitions a rosion test sample;	<u>NO</u> ry was low in be prior to re ed above, wa and explanati TR = thermal	TES the upper part of the run, the soil sample moval from the ground. s estimated during probing and should be on of symbols.			P	etro	Star North F	orth Pole Re Pole, Alaska	efinery								
3	2" Plas	stic Tube - No Soi	I Recovery	END Piezometer Screen and Sand Fi	lter	LO Julv :	OG () F	GEO	PROBE	SB-19-0	2 52							
	-Run N	¹ 0.	☑ Ground Water Level ATD		SHANNON & WILSON, INC. Figure 2														

									LC)G (OF G	EOPR	OB									
Date	Started	Location Petrostar North Pole Refinerv							(Ground Elevation: Unknown												
Date	Comple	əted	7/26/19	1		, i i i i i i i i i i i i i i i i i i i						1	Typical Run Length 5 feet									
Total	Depth	(ft)	15.0	Γ	Drillin	Drilling Company: GeoTek Alaska						I	lole [Diam	eter	•	3	3.75 inches				
Depth (ft)	Probe Run	Refe and a	er to the repo d probing me approximate t differen	ort t ethc bou t if	text for ods. T undarie soil sh	So r a pro The str es bet hifted	oper ul ratifica tween inside	escri Indersta ation lin soil typ sampl	anding nes indi pes. Ac le tubes	l of the su icated be ctual bou s during	ubsurface elow repri- undaries extraction	e materials resent the may be n.	Depth, ft.	⊲ € Symbol	PID, ppm		Construction		Sampl Des and	e Num criptio Resul	iber, ⁄n, ts	Depth (ft)
- - - - - - - - - - - - - - - - - - -		Bru (M fro Bru su Bru (G pre lay	bangular to wn, <i>Silt (M</i> <i>L</i>); moist. own, <i>Silty S</i> m 4.4-4.5 fr own, <i>Poorly</i> brounded. own to gray <i>P-GM</i>); wet esent, petrc yer of <i>Poorl</i> .	$\frac{1}{IL}$	Graded Graver subrounded. L) with interbect and (SM); mois set bgs. Graded Sand (, Poorly Graded , subangular to leum staining a , Graded Sand			wet at P); we Gravel ubroun 12.4-1 SP) at	2 foot la 2 foot la 1 4.4 fe 3, suba 7 with S inded; 12.6 fe 13.3-1	ayers o eet bgs angular Silt and petrole eet bgs; 3.7 fee	of Silt wi s, Grave r to Sand eum odo ; interbe et bgs.	ith Sand	- 2.0 - 3.6 - 5.0 - 6.5		2.6 3.2 5.3 230.6 2320 233.196 22320 0 394.7 1893 0 894.7 0 894.7 12.5			SB-1 SB-1	5B-19-03-6.5/SB- SB-19-03-7.5	5/SB-1 5	9-103-6.5	
		Ba Ma Flu To 2-i Sk Sk To	pring and m phitoring we ush-mounte op of casing nch-diamet ot size: 0.07 otted Intervi ptal depth of	ion ∋ll (∋d i j is ter 10 ′al: f w	nitorin details monu s 0.5 ft riser inche : 3.6 tr vell: 1	Ig we s: Jimen eet pipe 3S o 13. 3.6 fi	it .2 fee eet by	W19-0 ≯t bgs gs.)3, cor	npletec	d July 2	6, 2019.	- 15.0		A							
	<u>NOTES</u> 1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground. 2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate. 3. Refer to KEY for definitions and explanation of symbols. 4. CT = corrosion test sample; TR = thermal resistivity sample; EN = environmental sample; GE = geotechnical sample; AR = archeological sample. I EGEND								iple be al	Petro Star North Pole Refinery North Pole, Alaska								3				
	3 2" Plastic Tube - No Soil Recovery □□□ Piezometer Screen and Sand Filte 2" Plastic Tube with Soil Recovery ☑ Ground Water Level ATD Run No. ☑ ☑									and Filter	July 2019 101752							52 2				
										Geotechnical and Environmental Consultants Figure 3									3			

					LOG OF GEO	PRO	ROBE										
Date	Started	I	7/26/19	Location	Petrostar North Pole Refinery	G	Ground Elevation: Unknown										
Date	Comple	eted	7/26/19	-		Т	Typical Run Length 5 feet										
Total	Depth	(ft)	15.0	Drilling (Company: GeoTek Alaska	H	lole D	iam	eter:	3.75 inch	3.75 inches						
Depth (ft)	Probe Run	Ref an	er to the repo d probing me approximate b different	S rt text for a p thods. The oundaries b if soil shifted	Soil Description proper understanding of the subsurface mate stratification lines indicated below represent retween soil types. Actual boundaries may b d inside sample tubes during extraction.	orials the e	Depth, ft.	Symbol	PID, ppm	Well Construction	Sample Descr and F	Number, iption, esults	Depth (ft)				
- - - - - - - - - - - - - - - - - - -		Br 3.4 Br (G 4.2	own, <i>Poorly</i> bangular to own, <i>Silt (M</i> 5-3.9 feet by own to gray <i>P-GM</i>); wet 2-4.4 feet by	<i>Graded G</i> subrounde (L) with inte gs; moist, r , <i>Poorly Gi</i> , subangul gs.	ed inside sample tubes during extraction. Gravel with Silt and Sand (GP-GM); moi Jed. terbedded layer of Sandy Silt (ML) at , non-plastic. Graded Gravel with Silt and Sand ular to subrounded; iron oxide staining a	st, 2	2.3		10.3 1.4 5.6 5.8 5.9 5.9 5.9 5.9 5.9 5.9 5.9 5.9 5.9 5.9	During Drilling H	SB-19-04-4						
		B Fli Tc 2-i Sli Sli Tc	oring and m onitoring we ush-mounte op of casing inch-diamet ot Size: 0.0 otted Interva otal depth of	nonitoring v Il details: d monume is 0.4 feet er riser pip 10 inches al: 3.4-12.9 well: 13.3	well, MW19-04, completed July 26, 20 ent : bgs be 9 feet bgs feet bgs	19.	15.0		2								
	<u>NOTES</u> 1. In some cases where recovery was low in the upper part of the run, the soil sample may have slid down in the tube prior to removal from the ground. 2. Groundwater level, if indicated above, was estimated during probing and should be considered approximate. 3. Refer to KEY for definitions and explanation of symbols.							Petro Star North Pole Refinery North Pole, Alaska									
	4. CT = corrosion test sample; TR = thermal resistivity sample; EN = environmental sample; GE = geotechnical sample; AR = archeological sample. <u>LEGEND</u> 3. 2" Plastic Tube - No Soil Recovery											4					
	2" Pla: - Run N	stic T	ube with Soil	Recovery	☑ Ground Water Level ATD	J	luly 2	2019				1017	52				
r L				G	SHANNON & WILSON, INC. Geotechnical and Environmental Consultants Figure 4												

Appendix B Monitoring Well Sampling Logs
	1 01						A.C. S. C. S.G.
Owner/Client	tro Star	-				Project No.	101752
Location	North Pole	Retire	ny - 101	-SD Rel	ease	Date	7-25-19
Sampling Personnel	ALF/CIAB		/			Well	TWP19-0
Weather Conditions	notly Cloud	Ly Air	Temp. (°F)	60-70		Time started	15:37
	,	/			Tir	ne completed	16:15
Sample No TL	JP19-01		Time	16:03			
Duplicate Ti	DPIG-INI		- Time	15:53	-		/
Equipment Blank			- Time		-		-/
			-		0		/
Pump Po	- Runa						
Purging Method	tables / dedicate	d numn		Di	ameter and T	vne of Casing	SPIL
Pumping Start	able / dedicate	a pump	Approvin	Dia Data Total D	anteler and T	Selow MP (ft)	0176
Irae Rate (asl /min)	30		Moasi	red Total D	epth of Well I	Below MP (ft.)	17 23
Pumping End 16:	03		Measu		oth to Water	Below MP (ft.)	12:37
Fullping End <u>76.</u>	03			Depth to k	on (if frozon)	Below MP (ft.)	0,99
Pump Set Depth Bolow M	P(ft) a il			Depth to It	East of	Mater in Well	290
KuriTee Tubie	a (ft.)				Peer of	allons per feet	0 21
	g(ft) = 7C				6	allone in Mol	0.09
10. V. HUPOIY HUDIN	g (n.) <u>29</u>				Burgo Wator		0716
SiMOO			Durge M/a	tor Disposal	NIDR D	Volume (gal.)	gape
Ionument Condition	AIA		Pulge wa	lei Disposai	NFRU	12-Water	Separano
Casing Condition	Trovel						-
.	0.000				100		
Sha Shite and	1.						
Wiring Condition	Ma						
(dedicated pumps)		_					
occuring Doint (MD) Ton	of Cooling (TOC)		Monur	nont tuno:	Fickup	/ Eluchmount	
easuring Foint (IMF) <u>Top</u>	or casing (TOC)	N	logeuromor	t mothod:	Rod & loval	/ Tapo moasi	Iro
		IV	leasuremen	it method.	Rou & level	/ Tape measu	<i>ne</i>
GS	3 43			Det	alassastura	-	
op-or-casing to monumer	+(ft.) <u> </u>		-	Datala	alogger type	n/a	
onument to ground surface	e (π.)		- V.	Datalo	gger serial #	n/a	
	and a second		Me	asured cab	le length (ft.)	n/a	
A Lock present and	operational						
RA Well name legible	e on outside of we	ell					
RA Evidence of frost	-jacking						
1911							
aller and the							
Notes							
·		988 W.	i kato tak	1			
	h	WELL CA	SING VOL	UMES			
meter of Well [ID-inches]	CMT	11/4	2	3	4	6	8
alions per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

TWP 19-01 Well No.

Field Parameter Instrument	YSI Proplus	Circle one: Parameters stabilized	or \$3 well volumes purged)
Sample Observations			
Notes			

		FIE	LD FARAIVIETERS [Sta	abilization ci	itenaj	
Time	Temp. (°C)	Dissolved Oxygen (mg/L) [± 0.1 mg/L]	Conductivity (µS/cm) [± 3%]	pH [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
15:55	10.8	0,54	368,5	6.90	51.1	clear
12:56	10,9	0.53	3/3	6,80	Dit	(
16:07	10.7	0.37	317 5	6.00	0.9	
14:03	Same	ala	200,0	615		N/
	Jarroy			C. 11. 1977		All and the second second
						6

FIELD PARAMETERS [stabilization criteria]

Laboratory SGS

Analysis	Sample Containers	Preservatives	Du
GRO/BTEK (AK101/EPA	3 x 40-mL amber VOA vials	HCI	×
DRO/RED (AK102/AK103)	2 x 250-mL amber jar	HCI	×
PAH (8270D)	2 x 1-L amber jar	temp.	×
BTEX \$260	3× 40mL VOIts		×
			므
			므

1

TWP19-01 Well No.

Manument Condition	nla		Turge Wa	er Disposa	NED one	air scher	rator
Monument Condition	11/4		200 A 10			1.1	
Casing Condition	lond						
Casing Condition	6000						
Section 2 and a section	n la						
Wiring Condition	in						
Wiring Condition (dedicated pumps)	r cių						
Wiring Condition (dedicated pumps)	1014						
Wiring Condition (dedicated pumps) Measuring Point (MP)	Top of Casing (TOC)		Monur	nent type:	Stickup)	/ Flushmount	
Wiring Condition (dedicated pumps) Measuring Point (MP)	Top of Casing (TOC)	- N	Monun /leasuremen	nent type: t method:	Stickup	/ Flushmount / Tape measu	re
Wiring Condition (dedicated pumps) Measuring Point (MP)	Top of Casing (TOC)	- N	Monur /leasuremen	nent type: t method:	Stickup Rod & level	/ Flushmount / Tape measu	re
Wiring Condition (dedicated pumps) Measuring Point (MP)	Top of Casing (TOC)	- N 19	Monur /leasuremen	nent type: t method:	Stickup Rod & level	/ Flushmount / Tape measu	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to monu	Top of Casing (TOC)	- n 19	Monur /leasuremen	nent type: t method: Da	Stickup Rod & level	/ Flushmount / Tape measu n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su	Top of Casing (TOC)	- M	Monur /leasuremen 	nent type: t method: Da Datalo	Stickup Rod & level / talogger type_ ogger serial #_	/ Flushmount / Tape measu n/a n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to monu Monument to ground su	Top of Casing (TOC)	- M	Monur /leasuremen Me	nent type: t method: Da Datalo asured cab	Stickup Rod & level talogger type_ ogger serial #_ le length (ft.)	/ Flushmount / Tape measu n/a n/a n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su	Top of Casing (TOC)	- M 19	Monur /leasuremen Me	nent type: t method: Da Datalo asured cab	Stickup Rod & level talogger type ogger serial # le length (ft.)	/ Flushmount / Tape measu n/a n/a n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su Lock present	Top of Casing (TOC)	- M 19 N/A	Monur /leasuremen Me	nent type: t method: Da Datalo asured cab	Stickup Rod & level talogger type ogger serial # le length (ft.)	/ Flushmount / Tape measu n/a n/a n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su Lock present Well name let	Top of Casing (TOC)	- N 19 N/A vell N/A	Monur /leasuremen Me	nent type: t method: Da Datalo asured cab	Stickup Rod & level / talogger type ogger serial # le length (ft.)	/ Flushmount / Tape measu n/a n/a n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su Lock present Well name let Evidence of f	Top of Casing (TOC)	- N 19 N/A vell N/A	Monur /leasuremen Me	nent type: t method: Da Datalo asured cab	Stickup Rod & level , talogger type ogger serial # le length (ft.)	/ Flushmount / Tape measu n/a n/a n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su Lock present Well name le Evidence of t	Top of Casing (TOC)	- NA vell NA	Monur /leasuremen Me	nent type: t method: Da Datalo asured cab	Stickup Rod & level / talogger type ogger serial # le length (ft.)	/ Flushmount / Tape measu n/a n/a n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su Lock present Well name le Evidence of f	Top of Casing (TOC)	N/A vell N/A	Monur /leasuremen Me	nent type: t method: Da Datalo asured cab	Stickup Rod & level talogger type ogger serial # le length (ft.)	/ Flushmount / Tape measu n/a n/a n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su Lock present Well name le Evidence of f	Top of Casing (TOC)	- 19 N/A vell N/A	Monur /leasuremen Me	nent type: t method: Da Datalo asured cab	Stickup Rod & level talogger type ogger serial # le length (ft.)	/ Flushmount / Tape measu n/a n/a n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su Lock present Evidence of f Evidence of f	Top of Casing (TOC)	- 19 N/A vell N/A	Monur /leasuremen Me	nent type: t method: Da Datalo asured cab	Stickup Rod & level talogger type ogger serial # le length (ft.)	/ Flushmount / Tape measu n/a n/a n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su Lock present Vell name le Evidence of f	Top of Casing (TOC)	- 19 N/A vell N/A	Monur /leasuremen Me	nent type: t method: Da Datalo asured cab	Stickup Rod & level talogger type ogger serial # le length (ft.)	/ Flushmount / Tape measu n/a n/a n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su Lock present Vell name le Evidence of f	Top of Casing (TOC)	- 19 N/A vell N/A	Monur Jeasuremen – – Me	nent type: t method: Da Datalo asured cab	Stickup Rod & level	/ Flushmount / Tape measu n/a n/a n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su Lock present Evidence of f Notes	Top of Casing (TOC)	- N/A vell N/A	Monur Aeasuremen	nent type: t method: Da Datalo nasured cab	Stickup Rod & level	/ Flushmount / Tape measu n/a n/a n/a	те
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su Lock present Vell name le Vell name le Vell name le	Top of Casing (TOC)	- M 19 vell N/A	Monur Aeasuremen 	nent type: t method: Datalo Datalo	Stickup Rod & level	/ Flushmount / Tape measu n/a n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su Lock present Vell name le Vell name le Vell name le	Top of Casing (TOC)	- M 19 vell N/A well C/	Monur Jeasuremen 	nent type: t method: Da Datalo nasured cab	Stickup Rod & level / talogger type ogger serial # le length (ft.)	/ Flushmount / Tape measu n/a n/a n/a	re
Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to menu Monument to ground su Lock present Vell name le Evidence of f Notes	Top of Casing (TOC)	Vell N/A WELL C/	Monur Jeasuremen Me Me	nent type: t method: Da Datalo nasured cab	Stickup Rod & level	/ Flushmount / Tape measu n/a n/a n/a	re

Well No. TWP19-02

Field Parameter Instrument	1SI Pro Plus	Circle one: Parameters stabilized or >3 well volumes purged	þ
Sample Observations	none	the second se	
Notes	none		Ē

Dissolved Temp. Oxygen (mg/L) [± Conductivity (µS/cm) ORP (mV) pH Time (°C) 0.1 mg/L] [± 3%] [± 0.1] [± 10 mV] Water Clarity (visual) 8.9 0.21 6.22 0.21 6.84 6.85 6.87 333,7 805 16.1 site, forbid 329.6 808 16.5 cleer 1811 8,6 38 1814 9.6 6,88 0.20 335.2 12,6 u 11 1815 Sample

FIELD PARAMETERS [stabilization criteria]

Laboratory SGS

Analysis	Sample Containers	Preservatives	Du
GRO			
BTEX + naph	thalene		
10 A			
the second s			



Owner/Client	Petro Star				Project No.	101752
Location	North Pole Refine us				Date	8/7/2017
Sampling Personnel	CAB/ALF	- 1			Well	MW19-04
Weather Conditions	Closen	Ai	r Temp. (°F) 55	— т	ime started	1035
	8		and the second	Time	completed	1122
Sample No.	MW19-04		Time 1108	2		
Duplicate	T		Time 🚬	_		
Equipment Blank			Time	-		
Pump	w.le					
Purging Method	portable / dedicated	ממווח	Di	iameter and Typ	e of Casing	2"PVC
Pumping Start	1057	pump	Approximate Total C	Penth of Well Be	low MP (ft)	12.96
Purce Rate (gal /min)	N-B35		Measured Total C	Pepth of Well Be	low MP (ft)	12.96
Pumping End	LIAC		De	onth to Water Be	IOW MP (ft.)	34/
Fullping End	1100		Depth to J	ce (if frozen) Be	IOW MP (ft)	-
Pump Sot Dopth Bol	OW MR (ft) 0,96		Deptil to I	East of W	ater in Well	9.55
Fump Set Deptil Bei				Colle	ater in vven	B.17
TruPoly	Tubing (ft.) \sim			Gall	ons in Well	112
TUPOly				Burge Water Va	lume (gal)	HOE A
	the second se		Duras Water Dispose		June (gal.)	a citl
Monument Condition	Good		Purge water Disposa	707711	y pond	
Casing Condition	Good			<i>y</i>		
		_	1	-	and the second	
Wiring Condition (dedicated pumps)	N/A					
Measuring Point (MP)	Top of Casing (TOC)	M	Monument type: leasurement method:	Stickup / F Rod & level / T	lushmount ape measur	Ø
Top-of-casing to mon	ument (ft) 035	÷	Da	talogger type	n/a	
Monument to ground s	surface (ft.) \bigcirc		- Datalo	ader serial #	n/a	
Monument to ground a			- Measured cab	le length (ft)	n/a	
Look propo	nt and anarational M/M		weasured cap	le length (it.)	1i/a	
vveil name	freet looking	A . /	1			
	most-jacking	NI	(+			
Notes						
	14		SING VOLUMES			
		ELL CA	SING VOLUMES			

	1 1 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
4 6 8	3	2	11/4	CMT	Diameter of Well [ID-inches]
0.66 1.5 2.6	0.38	0.17	0.08	0.000253	Gallons per lineal foot
0.66 1.5	0.38	0.17	0.08	0.000253	Gallons per lineal foot

Field Parameter Instrument Red 0381 155 Sample Observations Notes 25 gallons Durge Prior to taking prometers 5

FIELD PARAMETERS [stabilization criteria]

Time	Temp.	Dissolved Oxygen (mg/L) [±	Conductivity (µS/cm)	pH	ORP (mV)	Water Clarity (viewal)
Time	(-C)	0.1 mg/Lj	[± 3%]	[± 0.1]	[± 10 mV]	vater Clarity (visual)
1055	0.7	4,55	1,200	1.02	278.7	6/62
ps F	7.9	1,34	25,2	6.87	125,7	cles
100	7.8	0,87	263.3	6.88	91.7	Clas
1103	7.8	0,80	265.4	6.91	53.9	Clear
1106	8,3	0,84	267.7	6.92	17,0	Cles
1198	Sande		The second second			
	1					5 Y
	-			100000		
				-		
						t.
-						
	2					

Laboratory SGS

Analysis	Sample Containers	Preservatives	D
620	3 × 40ml Amber VOA7	Hel	P
BTEX + Naphthat	RAP 3 × 40 mL Amber VOAY	HC	1

Well No. Aw19-04

Owner/Client	Stat				Project No.	01750
Location	H- Dole Refineurs	1			Date	8/6/2019
Sampling Personnel	S/ALF				Well	MW19-0
Weather Conditions	idy	Air Temp. (°I	F) 55	10.00	Time started	1145
	0		1.00	Tim	ne completed	1215
Sample No. Mu	19-03	Tim	e 1203			
Duplicate Mw	19-103	Tim	e 1152			
Equipment Blank		Tim	ie	-		
Pump Purging Method Pumping Start Purge Rate (gal./min.)	ble / dedicated pu	mp Approxi Meas	Di mate Total D sured Total D	iameter and Ty Depth of Well B Depth of Well B	pe of Casing elow MP (ft.) elow MP (ft.)	2" PUC 1.3.04 13.06
Pumping End 120	>		De	pth to Water Be	elow MP (ft.)	3,19
			Depth to le	ce (if frozen) Be	elow MP (ft.)	*
Pump Set Depth Below MP	(ft.) 1.06			Feet of V	Vater in Well	9.92
KuriTec Tubing	(ft.) <u>15</u>			Gal	lons per foot	ØIZ
TruPoly Tubing	(ft.)			Ga	llons in Well	1.69
				Purge Water V	olume (gal.)	1015
		Purge Wa	ater Disposal	Sellin	Dand on Si	He
Monument Condition 60	ed					
Casing Condition	d					
Casing Condition <u>Case</u> Wiring Condition <u>N</u> (dedicated pumps) <u>Top of</u>	Casing (TOC)	Monu	ment type:	Stickup	Flushmount	\sim
Casing Condition <u>Correct</u> Wiring Condition <u>M</u> (dedicated pumps) <u>Top of</u>	Casing (TOC)	Monu Measuremer	ment type: nt method:	Stickup	Flushmount Tape measure	
Casing Condition <u>Goe</u> Wiring Condition <u>M</u> (dedicated pumps) <u>Top of</u> Measuring Point (MP) <u>Top of</u> Top-of-casing to monument (Monument to ground surface ((ft.)	Monu Measuremer	ment type: nt method: Datalog easured cabl	Stickup 11 Rod & level (1 alogger type _ gger serial #_ e length (ft.)	Flushmount Tape measure n/a n/a n/a	
Casing Condition <u>Geor</u> Wiring Condition <u>M</u> (dedicated pumps) <u>M</u> Measuring Point (MP) <u>Top of</u> Top-of-casing to monument (Monument to ground surface (Lock present and o Well name legible o Evidence of frost-ja	(ft.) <u>0.52</u> (ft.) <u>1</u> (ft.) (ft.) (Monu Measuremer Ma	ment type: nt method: Datalog easured cabl	Stickup [// Rod & level // alogger type _ gger serial #_ le length (ft.) _	Flushmount Tape measure n/a n/a n/a	
Casing Condition <u>Goe</u> Wiring Condition <u>M</u> (dedicated pumps) Measuring Point (MP) <u>Top of</u> Top-of-casing to monument (Monument to ground surface (<u>Exidence of frost-jac</u> Notes	(ft.) (ft.) (ft.) (ft.) perational N/A on outside of well cking/	Monu Measuremer Ma	ment type: nt method: Datalog easured cabl	Stickup // Rod & level // alogger type _ gger serial # le length (ft.) _	Flushmount Tape measure n/a n/a n/a	
Casing Condition Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to monument (Monument to ground surface (Monument to ground surface (Lock present and o Well name legible of Evidence of frost-jace Notes	(ft.) (ft.) (ft.) (ft.) (ft.) perational N/A on outside of well cking	Monu Measuremer Ma	ment type: nt method: Datalog easured cabl	Stickup [7] Rod & level [7] alogger type _ gger serial # le length (ft.) _	Flushmount Tape measure n/a n/a n/a	
Casing Condition Wiring Condition (dedicated pumps) Measuring Point (MP) Top-of-casing to monument (Monument to ground surface (Monument to ground surface (Lock present and o Well name legible o Evidence of frost-jaces Notes	(ft.) <u>0.52</u> (ft.) <u>152</u> (ft.) <u>152</u> (ft.) <u>152</u> (ft.) <u>152</u> (ft.) <u>152</u> (ft.) <u>152</u> (ft.) <u>152</u> (ft.) <u>152</u> (ft.) <u>152</u>	Monu Measuremer Ma	ment type: nt method: Datalog easured cabl	Stickup // Rod & level // alogger type _ gger serial #_ le length (ft.) _	Flushmount Tape measure n/a n/a n/a	
Casing Condition	(ft.) (ft.) (ft.) (ft.) perational N/A on outside of well cking	Monu Measuremer Ma	ment type: nt method: Datalog easured cabl	Stickup 11 Rod & level 1 alogger type _ gger serial # le length (ft.) _	Flushmount Tape measure n/a n/a n/a	
Casing Condition	(ft.) (ft.) (ft.) (ft.) perational N/A on outside of well cking WELL WELL	Monu Measuremer Ma	ment type: nt method: Datalog easured cabl	Stickup // Rod & level // alogger type _ gger serial # le length (ft.) _	Flushmount Tape measure n/a n/a n/a	
Casing Condition	Casing (TOC) ft.) (ft.) (ft.) <td>Monu Measuremer Ma CASING VOL</td> <td>ment type: nt method: Datalog easured cabl</td> <td>Stickup // Rod & level // alogger type _ gger serial # e length (ft.) _</td> <td>Flushmount Tape measure n/a n/a n/a</td> <td>8</td>	Monu Measuremer Ma CASING VOL	ment type: nt method: Datalog easured cabl	Stickup // Rod & level // alogger type _ gger serial # e length (ft.) _	Flushmount Tape measure n/a n/a n/a	8

Well No. Mw19-03

Sample Observations

Field Parameter Instrument (SE Renta) 0381 Circle one: Parameters stabilized or 3 well volumes purged

Notes

$\begin{array}{ c c c c c c c c c c c c c c c c c c c$			FIE	LD FARAMETERS [SI	abilization c	ntenaj		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Time	Temp. (°C)	Dissolved Oxygen (mg/L) [± 0.1 mg/L]	Conductivity (µS/cm) [± 3%]	pH [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	149	8.1	Gint	351.0	6.79	-8.9	clas	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	152	8,2	4.54	3472	6.83	- 79.7	CLAS	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	155 .	- 8,2	3.30	3461	6.84	-128.0	das	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	158	9.1	2.08	342.7	6.87	-159.9	Clear	
203 Sample	101	7.9	1,22	341.6	6.82	-178,9	Cles	
	203	Samole						
				and the second second				
Image: second							(
Image: selection of the								1
Image: selection of the se	÷				-	3349		4
Image: state stat						*	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	
						1		_
Image: Section of the section of t								
	~						1941 - 1941 - 1941 - 1941 - 1941 - 1941 - 1941 - 1941 - 1941 - 1941 - 1941 - 1941 - 1941 - 1941 - 1941 - 1941 -	
		1			1			

D PARAMETERS [stabilization aritaria] -----

Laboratory SGS

malian al line		
SX40ML Amber VOA	HCI	
le ti	HC.	므
	8	므
		_
	le 11	Re 11 KC

Well No. MW19-03

	Ketro Star				Project No	101752
Location	JPR Retirery		~	-	Date	811/2019
Sampling Personnel	ABIALE			-	Well	MW15-4
Weather Conditions	Partla Claudia	Air Temp (°F)	65		Time started	1231
		7.0 Temp. (1)	6/	— T	me completed	1307
	0		×			- MA
Sample No	MW15-4	Time	1253			
Duplicate		Time	1001			
Equipment Blank		Time				
		1ime		-		
Pump	male					
Purging Method	ortable / dedicated	חמווח		iameter and T	vne of Casing	D" NC
Pumping Start	131 dedicated	Approvim	ata Total I	Depth of Well	Bolow MD (ft)	a 1
Purge Rate (gal /min)	01C	Approxim	rod Total I	Depth of Well	Below MP (IL)	11107
Pumping End	57	Measu	red Total I	Depth of Well	Below MP (ft.)	19157
Fullping End 10			De	epth to vvater	Below IVIP (ft.)	4.04
During Oct Durit, D. 1	100 10 10 17		Depth to	ice (if frozen)	Below MP (ft.)	-
Pump Set Depth Below	WP (ft.) 205 7			Feet of	Water in Well	10,55
KuriTec Tub	bing (ft.) $\underline{15, 0}$			G	allons per foot	0,17
TruPoly Tub	ping (ft.)			G	allons in Well	1,79
				Purge Water	Volume (gal.)	8
	1	Purge Wate	er Disposa	al Softlin	Cord on S	10
Monument Condition	200					
Casing Condition	roed		_			
Wiring Condition <u>/</u> (dedicated pumps)	1/A					
Contraction of the second s	1		ent type:	Stickup	Eluphrount	
Measuring Point (MP)	op of Casing (TOC)	Ivionum	on ypo.	Ouonap	Flushmount	5
Measuring Point (MP) <u>7</u>	op of Casing (TOC)	Measurement	method:	Rod & level	Tape measure	5
Measuring Point (MP) <u>7</u>	op of Casing (TOC) ent (ft.)	Measurement	method: Da	Rod & level	Tape measure	5
Measuring Point (MP) <u>70</u> Top-of-casing to monume Monument to ground surfa	op of Casing (TOC) ent (ft.) ace (ft.)	Measurement	method: Datale	Rod & level atalogger type	n/a n/a	2
Measuring Point (MP) <u>70</u> Top-of-casing to monume Monument to ground surfa	op of Casing (TOC) ent (ft.) ace (ft.)	Monum Measurement	method: Da Datalo	Rod & level	n/a n/a n/a	2
Measuring Point (MP) <u>7</u> Top-of-casing to monume Monument to ground surfa	ent (ft.) <u>B.S.7</u> ace (ft.)	Measurement	method: Datak Datak	Rod & level	n/a n/a n/a n/a	<u>></u>
Measuring Point (MP) <u>7</u> Top-of-casing to monume Monument to ground surfa	ent (ft.) <u>8.57</u> ace (ft.) <u>8.57</u> ace operational <u>N/A</u>	Measurement	method: Datald asured cat	Rod & level	n/a n/a n/a	3
Measuring Point (MP) <u>7</u> Top-of-casing to monum Monument to ground surfa	ent (ft.) <u>B.57</u> ace (ft.) <u>B.57</u> ace (ft.) <u>B.57</u> ace operational <u>M/A</u> ble on outside of well	Measurement	method: Da Datale	Rod & level atalogger type ogger serial # ote length (ft.)	n/a n/a n/a n/a	<u>></u>
Measuring Point (MP) <u>7</u> Top-of-casing to monume Monument to ground surfation Lock present at U Well name legit E Evidence of from	ent (ft.) <u>B.57</u> ace (ft.) <u>B.57</u> ace (ft.) <u>B.57</u> ace of the st-jacking <u>M</u>	Measurement	method: Datalo asured cal	Rod & level	n/a n/a n/a n/a	<u></u>
Measuring Point (MP) <u>7</u> Top-of-casing to monume Monument to ground surfation Lock present an U Well name legit E Evidence of from	ent (ft.) <u>B.S.7</u> ace (ft.) nd operational <u>M/A</u> ble on outside of well st-jacking <u>/</u>	Measurement	method: Datalo asured cat	Rod & level	n/a n/a n/a n/a	<u></u>
Measuring Point (MP) <u>7</u> Top-of-casing to monume Monument to ground surfa <u>Lock present ar</u> Well name legit <u>U</u> Evidence of from Notes	ent (ft.) <u>B.57</u> ace (ft.) <u>B.57</u> ace (ft.) <u>B.57</u> ace of the st-jacking <u>M</u>	Measurement	method: Datald Datald	Rod & level	n/a n/a n/a n/a	<u></u>
Measuring Point (MP) <u>7</u> Top-of-casing to monumer Monument to ground surfate Lock present an U Uell name legit Evidence of from Notes	ent (ft.) <u>B.S.7</u> ace (ft.) nd operational <i>N/A</i> ble on outside of well st-jacking	Measurement	method: Datald asured cat	Rod & level	n/a n/a n/a n/a	<u> </u>
Measuring Point (MP) <u>7</u> Top-of-casing to monume Monument to ground surfa Lock present an Well name legit Evidence of from Notes	ent (ft.) <u>B.57</u> ace (ft.) nd operational <u>MA</u> ble on outside of well st-jacking <u></u>	Measurement	method: Datald Datald	Rod & level	n/a n/a n/a n/a	<u> </u>
Measuring Point (MP) Top-of-casing to monume Monument to ground surfa Lock present at Well name legit Evidence of from 	ent (ft.) <u>B.57</u> ace (ft.) nd operational <u>MA</u> ble on outside of well st-jacking <u></u>	Measurement	method: Datald Datald	Rod & level	n/a n/a n/a n/a	
Measuring Point (MP) Top-of-casing to monume Monument to ground surfa Lock present ar Well name legil Evidence of from Notes	ent (ft.) <u>B.S.7</u> ace (ft.) <u>B.S.7</u> ace (ft.) <u>B.S.7</u> ace on outside of well ble on outside of well st-jacking <u>W</u>		MES	Rod & level	n/a n/a n/a n/a	
Measuring Point (MP) Top-of-casing to monume Monument to ground surfa Lock present at Well name legil Evidence of from Notes	ent (ft.) <u>B.57</u> ace (ft.) <u>B.57</u> ace (ft.) <u>B.57</u> and operational <i>M</i> /A ble on outside of well st-jacking <u>V</u>	Measurement Measurement Measurement Measurement Measurement	MES	Atalogger type ogger serial # ole length (ft.)	n/a n/a n/a n/a 6	8

Well No. MW 15-4

Ø 3&1
Circle one: Parameters stabilized or >3 well volumes purged

Field Parameter Instrument (SCRo Pos Rain) 0381 Circle or Sample Observations

Notes

		FIEL	D PARAMETERS [st	abilization c	riteria]	
Time	Temp. (°C)	Dissolved Oxygen (mg/L) [± 0.1 mg/L]	Conductivity (µS/cm) [± 3%]	рН [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
1239	9,3	1.72	306.8	6.83	14612	clast
1242	9.0	1134	304.3	6.83	116.1	des
1245	816	1811	303,7	6,83	96,4	clas
1248	8.5	1,05	304.2	6.83	83.6	Clear
1251	8.5	0.92	304.0	6.82	95,-	Clew
1253	Smole					
1255-	Ser					
					and the second	
		· · · · · · · · · · · · · · · · · · ·				1994
				-		
				44		
				+		

Laboratory SGS

Sample Containers	Preservatives	Du
3 × VOA 4ml	HC1.	므
3x 40ml Amber VOA	HCI	므
		므
	Sample Containers 3 × VOA 49ml 3 × 40 ml Amber VOA	Sample Containers Preservatives 3 × VOA 492 HCI 3 × 402 Amber VOA HCI

Well No. MU15-4

Owner/Client	Petro	Star A	•				Project No.	101752
Location	North	Pole Ret	inon		1		Date	8/6/209
Sampling Personnel	CAB/AC	LF	,				Well	mw19-01
Weather Conditions	Cloude (5	A	ir Temp. (°F)	60	т	Time started ime completed	1400
Sample No. Duplicate	MW10	1-01		Time	1422	-		
Equipment Blank	EBIO	1-01		Time	1615			
Pump	Wh.	re						ON DUL-
Purging Method	portable)/ dedicate	ed pump		D	iameter and	Type of Casing	2 Fre
Pumping Start	1404	ie .		Approxim	nate Total E	Depth of Well	Below MP (ft.)	iller
Purge Rate (gal./min.)	~0,7	2		Weasu	Ired I otal L	Depth of Well	Below MP (ft.)	8.91
Pumping End	19 00	-			Depth to I	lce (if frozen)	Below MP (ft.)	hop
Pump Set Depth Bel	w MP (ft.)	9.91			Deptilito	Feet o	f Water in Well	8.84
KuriTec	Fubing (ft.)	15				G	allons per foot	Q7
TruPoly ⁻	Fubing (ft.)	-					Gallons in Well	1.5
100 C						Purge Wate	r Volume (gal.)	1
Monument Condition	Cro			Purge Wat	er Disposa	I <u>Settli</u>	ny pond on s	sty somp
Casing Condition	Good							
- Wiring Condition (dedicated pumps)	NI	'A	-				5 K	
(domonion painipo) -								
Measuring Point (MP)	Top of Ca	asing (TOC)	Ν	Monun /leasuremen	nent type: t method:	Stickup 🤇 Rod & level	/ Flushmount	è
Top-of-casing to mon	ument (ft.)	s)		_	Da	talogger type	n/a	/
Monument to ground s	urface (ft.)	> more		- 53	Datalo	ogger serial #	n/a	
□ Lock preser □ Well name I □ Evidence of	at and oper egible on o frost-jacki	rational Contractional Contraction of weights of the second secon		Me	asured cat	ble length (ft.)	n/a	
Notes							1	
V (1)								
	_							
and the second		1	WELL C	ASING VOL	UMES			
Diameter of Well [ID-inches]		CMT	11/4	2	3	4	6	8
Gallons per lineal foot		0.000253	0.08	0.17	0.38	0.66	1.5	2.6

Well No.

MW19-01

JGI Ruia Field Parameter Instrument Sample Observations

Circle one: Parameters stabilized or >3 well volumes purged

4 up

Notes

FIELD PARAMETERS [stabilization criteria]

		Dissolved				
	Temp.	Oxygen (mg/L) [±	Conductivity (µS/cm)	Hq	ORP (mV)	
Time	(°C)	- 0.1 mg/L]	[± 3%]	[± 0.1]	[± 10 mV]	Water Clarity (visual)
406	13,2	0,50	292.7	6.63	-410	clas
1409	13.3	0.57	292.0	6.62	-17,4	- Cl = S
1414	13,6	0,78	2945	6.60	-29.9	Clear
1417	13,4	1/21	2943	0.59	-465	Chens
1420	13.4	1.29	290.6	6.58	-42.5	chen
1422	Smoll					
				Second Street		
				Q		
1						
	i na					
		in the second second				
				1		
			-			

Laboratory SGS

Sample Containers	Preservatives	Du
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	Sample Containers	Sample Containers Preservatives

Well No. MW19-01

Quinas/Cliant P	for 5.	L				2.0.04	101707
	AL DE	Jar				Project No	D. 101756
Sampling Personnel	APT	AR			<u></u>	Dat	e 8- +/ 9
Weather Conditions	TLFIC	ATS	Air Tomp /ºF	10	<u> </u>	VVe Time starts	11/10/15-1
	VEN COLS	<u>+</u> /	All Temp. (F	0 60		ime complete	d 12:20
Sample No	W15=7	L.	Tim	e 12:0	57		
Duplicate			Tim	e			
Equipment Blank			Tim	e	-		
Pump_Wl	ale	_	-				10.000
Purging Method _ portak	le) / dedicat	ed pump		C	Diameter and	Type of Casing	g 2" PVC
Pumping Start 11:5	L		Approxir	mate Total	Depth of Well	Below MP (ft.)
Purge Rate (gal./min.) ~ 0, L	(Meas	ured Total	Depth of Well	Below MP (ft.	14,36
Pumping End 12:0	7			D	epth to Water	Below MP (ft.	3.63
	1771			Depth to	Ice (if frozen)	Below MP (ft.)
Pump Set Depth Below MP (ft.) 12.56				Feet o	f Water in Wel	10.73
KuriTec Tubing (ft.)Q	-			G	allons per foo	t_0,17
TruPoly Tubing (ft.)	_			de la constante de la	Gallons in Wel	~118
			1.000	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	Purge Wate	r Volume (gal.)	<u>~6,4</u>
	bd		Purge Wa	ter Disposa	al <u>Sett()</u>	g pond o	nsite
Casing Condition	ol						
Wiring Condition (dedicated pumps)	la						
Manageria Daist (MD)					- W. T	6	
Measuring Point (MP) 10p of	Casing (TOC)		Monur	nent type:	Stickup	(/Flushmount	2
			vieasuremer	it method:	Rod & level	ATape measu	ure
Top of opping to menument (f	N AL	10			a de la de la de	/	
Top-of-casing to monument (f	.) 0:9	1		Da	atalogger type	n/a	
Monument to ground surface (f			-	Datal	ogger serial #	n/a	
I ask upper and and	Section 1		IVIE	easured cal	ble length (ft.)	n/a	
Lock present and op	erational				-		
vveli name legible or Evidence of front inc.	outside of we	ell					
Evidence of frost-jac	king .	ne	she			8	
Notes							
		_					
1							
		WELL C		UMES			
Diameter of Well [ID-inches]	CMT	11/4	2	3	4	6	8
Gallons per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

Well No. MW15-2

Field Parameter Instrument 451 Pro Pluscircle one: Parameters stabilized or >3 well volumes purged Sample Observations pump start Ri at Notes Pussemater very toshid And FIELD PARAMETERS [stabilization criteria] Dissolved Oxygen (mg/L) [± Conductivity (µS/cm) pН ORP (mV) Temp. Water Clarity (visual) [± 0.1] [± 10 mV] 0.1 mg/L] [± 3%] Time (°C) clean 263,0 10.3 5,03 237.8 79 " City 80 8 4.08 8 27 60,2 9 57.8 97 9 7 256.1 G.C 7.6 764.8 9.0 2. :06 55 12:07 JAAN 10

Laboratory SGS

Sample Containers	Preservatives	Dup
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Malene		므
		旦
		므
		므
		므
	Sample Containers	Sample Containers Preservatives

Well No. MW15-Z

Owner/Client	Pet	no St	m				Project No.	101752
Location	N	PR				_	Date	519
Sampling Personnel	141	F, CAE	<u>.</u>	- (0)=)	1.0	2	Well Time started	MW10-03
Weather Conditions	Kain		Air	Temp. (°F)	60s	- Tim	e completed	15 30
Sample No.	Mh	10-03	3	Time	15:24	1		
Duplicate		/		_ Time	-/	_		
Equipment Blank		/		_ Time	_/	-		
Pump	who	ale			1			04044
Purging Method	portable	/ dedicated	d pump	A second	Di	ameter and Ty	pe of Casing	L'YVC.
Pumping Start	15:06			Approxim	ate Total D	epth of Well B	elow MP (ft.)	12/1
Purge Rate (gal./min.)	N0,4			Measu	red Total D	epth of Well B	elow MP (ft.)	15.66
Pumping End	15:24				De	pth to Water B	elow MP (ft.)	3.25
		10			Depth to I	ce (if frozen) B	elow IVIP $(\pi.)$	100 41
Pump Set Depth Bel	ow MP (ft.)	NIC				Feet of v	Vater in vveil	10, 11
KuriTec	Tubing (ft.)	20				Ga	allons in Well	137
TruPoly	i ubing (π.)					Purge Water \	/olume (gal.)	72
				Purde Wat	er Disposa	Saftlin	Deval	cosife
Monument Condition	Loos	e in a	mour	el. No	Fseu	re.	3 france	
Casing Condition Wiring Condition (dedicated pumps)	to app to p n/a	e h g prozin ush it	atel	d. The y gro n.	ind l	avel.	frost; Steppe	d on it
Measuring Point (MP)	Top of Ca	sing (TOC)	N	Monur leasuremen	nent type: t method:	Stickup 🛛 🗶	Flushmount Tape measu	ire
Top of casing to mor	ument (ft)	0.5	0		Da	talogger type	n/a	
Monument to ground s	urface (ft.)			-	Datalo	ogger serial #	n/a	
Worldment to ground a				– Me	asured cat	ble length (ft.)	n/a	
 □ Lock prese □ Well name ∠ Evidence o 	nt and oper legible on o f frost-jacki	rational outside of we	" 5ee	- casih	g not	e		
Notes								
AV46.5								
						4		
			WELL CA	ASING VOL	UMES	(
Diameter of Well [ID-inches]		CMT	11/4	E	3	4	6	8
Gallons per lineal foot		0.000253	0.08	(0.17)	0.38	0.66	1.5	2.6

Well No. MW10-03

Field Parameter Instrument	YSI Roplus Circle one: Parameters stabilized or >3 well volumes purged
Sample Observations Notes	

	FIELD PARAMETERS [stabilization criteria]							
Time	Temp. (°C)	Dissolved Oxygen (mg/L) [± 0.1 mg/L]	Conductivity (µS/cm) [± 3%]	рН [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)		
15:11	7.9	1.10	280.4	7.20	29.8	clear		
15:14	7.9	0.90	277.2	7.19	42.6	ſ		
15:17	7.9	0.82	276.3	7.18	45.3			
15:20	7.9	0.75	275.1	7.18	48.8			
15:23	8.0	0.68	2737	1.17	52.2			
15:24	Samo	lo			0	V		
.2.51	20100	ne	100 A					
-								
-			+					
		1			- 14			
1	9	Standard Bar	112		Section 1995	Line in the second s		
5.2.2	Sec.	5	A CX N					
				10 x 10		11		
				+	2			

FIELD PARAMETERS [stabilization criteria

Laboratory	SGS	 1000

Sample Containers	Preservatives	Du
		<u>_</u>
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121 8		
		므
	Sample Containers	Sample Containers Preservatives

D	1. 51	12-8-				S. S. S. S.	1
Owner/Client	the sta				- 1	Project No	101+5C
Location	NPK				_	Date	8-4-19 3
Sampling Personnel	ALF, CAD	1		7.6	_	We	MW15-9 AU
Weather Conditions	Ally Clou	sdy 1	Air Temp. (°F)	605		Time started	1305
Sample No/	MW15-	y A	NF Time	12:5	7		
Duplicate	1		Time	1	_		
Equipment Blank	_/		Time		-		
Pump_W	rale						011 2:00
Purging Method	able) / dedicate	d pump)	D	iameter and	Type of Casing	TT PVC
Pumping Start 12:4	12		Approxim	ate Total [Depth of Wel	Below MP (ft.	
Purge Rate (gal./min.)	4		Measu	red Total [Depth of Wel	Below MP (ft.)	14.45
Pumping End 12:	57			De	epth to Water	Below MP (ft.)	3.33
				Depth to I	lce (if frozen)	Below MP (ft.)	
Pump Set Depth Below MP	(ft.) ~19				Feet o	f Water in Wel	11.12
KuriTec Tubing	(ft.) <u>25</u>				C	Gallons per foo	0,17
TruPoly Tubing	(ft.)					Gallons in Wel	~1.9
					Purge Wate	r Volume (gal.)	~6.0
1	- 1		Purge Wat	er Disposa	a sett	ling pon	dansile
Monument Condition(>	000			244.25		ų	
	<u>19</u> 22						
Casing Condition	ood						
	1000 X 21			1			
	,						
Wiring Condition	rla						
(dedicated pumps)							
1999 - 1997 - 1997							
Measuring Point (MP) Top	of Casing (TOC)		Monum	ent type:	Stickup	/ Elushmount	2
	, outing (100)		Measurement	method:	Rod & leve	/ Tane measu	IFA
			measurement	methou.	nou diever	i lape meda	and the second
Top of opping to monumont	(#) 07	9		De	tologgor tupo	-	
Nonument to ground ourfeed		ma	-	Datala	italogger type		
Monument to ground surface	(n.) - 0.0	00		Dataid	bgger serial #	n/a	
			IVIea	asured cab	ble length (ft.)	n/a	
Lock present and	operational	6					
Well name legible	on outside of we	II				1	
Evidence of frost-j	acking _	mon	ne				
Notes							
	a.U	WELL C	ASING VOLU	MES			
Diameter of Well [ID-inches]	CMT	11/4	2	3	4	6	8
Gallons per lineal foot	0.000253	0.08	(0.17)	0.38	0.66	1.5	2.6

Well No. MWIS-YALF

Field Parameter Instrument <u>VSI Ro Plus</u> Circle one: <u>Carameters stabilized</u> or >3 well volumes purged Sample Observations

Notes Purgewater very turbid + brown at pump stort.

FIELD PARAMETERS [stabilization criteria]

_	Temp.	Dissolved Oxygen (mg/L) [±	Conductivity (µS/cm)	pH	ORP (mV)	Mater Clarity (views))
Time	(°C)	0.1 mg/L	[± 3%]		[± 10 mV]	Vvater Clarity (Visual)
12:44	7.2	1.97	232.4	6,77	247.0	clear
12:47	7.3	0.95	242.1	6,77	241,4	C
12:50	7.4	0.80	245.0	6.79	237.5	
12:53	7.4	0.75	247,1	6.80	235,2	
17:56	7.4	0.80	248.5	6,80	235.3	
12:57	Serie	10		0.00		
10.21	South					2
- C. C						4 1. (2)
				-		
					0.5	
100 1 100						
			and the second			e,
						-
					× * *	
1						

Laboratory SGS

Analysis	Sample Containers	Preservatives	Du
GRO		1. 1g . 1	므
BTEX + no	aphthalene		므
	0		므
			므

Well No. MWS15-4 ALF

Owner/Client Location Sampling Personnel Weather Conditions	Petro Star NPR ALE, CIAB Mastles Call	ida, Ai	r Temp. (°F)	605		Project No. Date Well Time started	101752 8-7-19 MW19-02
Sample No Duplicate _ Equipment Blank _	mw19-02	- 1	_ Time _ Time _ Time	16:20		ne completed	1632
Pump Purging Method Pumping Start Purge Rate (gal./min.) Pumping End Pump Set Depth Belo KuriTec 1 TruPoly 1	whole 000000000000000000000000000000000000	l pump	Approxim Measu	D ate Total I red Total I Depth to	iameter and Ty Depth of Well E Depth of Well E Epth to Water E Ice (if frozen) E Feet of N Ga Purge Water N	ype of Casing Below MP (ft.) Below MP (ft.) Below MP (ft.) Below MP (ft.) Water in Well Illons per foot allons in Well Volume (gal.)	2" PVC 12.73 3.71 9.02 0.17 ~1.5 7.2 0.14
Monument Condition Casing Condition - Wiring Condition (dedicated pumps)	6000 Good n/a						
Measuring Point (MP)	Top of Casing (TOC)	N	Monum leasurement	ent type: method:	Stickup / Rod & level /	/ Flushmount / Tape measur	Pe
Top-of-casing to mon	ument (ft.)			Da Datal	atalogger type _ ogger serial #	n/a n/a	
Monument to ground su	t and operational ∋gible on outside of wel frost-jacking	no	Me	asured cal	ble length (ft.)	n/a	
Monument to ground si Lock presen Well name lo Evidence of Notes	t and operational egible on outside of wel frost-jacking	Ne	Me	asured cal		n/a	
Monument to ground si	t and operational egible on outside of wel frost-jacking	WELL CA	Mer	IMES		n/a	
Monument to ground si Lock presen Well name lo Evidence of Notes	t and operational egible on outside of wel frost-jacking	NELL CA	Mean ASING VOLU	IMES 3	ole length (ft.)	n/a	8

Well No. MW19-02

Field Parameter Instrument <u>YST</u> Pro PlusCircle one: Parameters stabilized or <u>3 well volumes purged</u>) Sample Observations Notes

FIELD PARAMETERS [stabilization criteria] Dissolved Temp. Oxygen (mg/L) [± Conductivity (µS/cm) pН ORP (mV) Water Clarity (visual) [± 3%] (°C) 0.1 mg/L] [± 0.1] [± 10 mV] Time 0,64 0,64 0,59 0,64 0,65 7.13 9.8 41.9 270. clear 6:13 274.5 11.4 16:16 7,11 9.9 -13.3 6:19 4 7.11 35.3 35. 6:2 10.0 10,0 25 (1 -Sample. ÷

Laboratory SGS

Analysis	Sample Containers	Preservatives	Du
GRO			<u>_</u>
BTEX			므
DRO			므
			므
			므
			므

Well No. MW19-DZ

Ourses/Oliset	Poto Star				
Owner/Client_	10110 5101	and the second second		Project No.	101752
Location_	NFR			Date	8-7-19
Sampling Personnel	ALF, CALS			Wel	MW15-1
weather Conditions_	Over cast	Air Temp. (°F) 🍃	05	Time started Time completed	11:18
Sample No	MAL NIC -1		-10		
Duplicate	product 5-1	Time(
Equipment Blank			<u>/</u>		
Pump	Whale				
Purging Method	portable / dedicated	pump	Diameter and	Type of Casing	2" PUC.
Pumping Start	10:54	Approximate 1	otal Depth of We	Il Below MP (ft)	- 100
Purge Rate (gal./min.)	20.3	Measured T	otal Depth of We	II Below MP (ft.)	13.80
Pumping End	11:11	modourou	Depth to Wate	r Below MP (ft.)	37/1
		Dep	th to Ice (if frozen) Below MP (ft.)	2,19
Pump Set Depth Below	w MP (ft.) ~ 12		Feet o	of Water in Well	12.11
KuriTec T	ubing (ft.) 20			Gallons per foot	A.17
TruPoly T	ubing (ft.)			Gallons in Well	~1.7
			Purge Wate	er Volume (gal.)	151 1
Monument Condition	bood - si	Purge Water Dis	sposal Drum	; NPK oil.	water separate
Casing Condition	Good - see	2 note			
- 17 M M - 3					
Wiring Condition (dedicated pumps)	nla				
Measuring Point (MP)	Top of Casing (TOC)	Monument ty Measurement meth	vpe: Stickup lod: Rod & level	/ Flushmount I / Tape measur	8
T	A 32			-	-
I op-of-casing to monur	ment (ft.) 0.33	-	Datalogger type	en/a	
Monument to ground sur	face (ft.)	<u>-0.15</u>)atalogger serial #	t n/a	
1 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -	Salad an and a share of	Measure	d cable length (ft.)	n/a	
Lock present	and operational		/		
vvell name leg	gible on outside of well	1-			
Evidence of fr	ost-jacking	see note		_	
Notes Cut ca	sing; pre-cut	L TOC-TOM	was 0.2	0'	
	WF				
Diameter of Well [ID-inches]	СМТ	11/4 2 3	4	6	8
Gallons per lineal foot	0.000253	0.08 0.17 0.3	8 0.66	15	26
		0.0	0.00	1.0	2.0

Well No. MW 15-1

1

Field Parameter Instrument	YSI	Pro	Redircle one:	Parameters stabilized) or >3 well volumes purged
Sample Observations				
Notes				

		FIE	LD FARAIMETERS [Sta	aphization	itenaj	
Time	Temp. (°C)	Dissolved Oxygen (mg/L) [± 0.1 mg/L]	Conductivity (µS/cm) [± 3%]	рН [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
10:58	8.2	1.19	2703	683	286.9	clear
11:01	7.7	0.64	766.3	6.84	281.1	
11.04	77	ALEI	2170	187	7718	(
11:07	11	A.217	116.8	281	177.7	
11:10	18	0.46	7447	7.80	1710	
11.11	Samo	0.40	20011	-0100	21010	4
VIII	Sand					
					100	
				-		
					1.1.1	
1.						
				C		
				1. 1. A.		
	۲					

FIELD PARAMETERS [stabilization criteria]

Laboratory SGS	0	1
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	Analysis	Sample Containers	Preservatives	Dup
hs.	GRO			<u>_</u>
¢.	BTEX + nao	Whalene		므
	1			
므				
				므



Owner/Client	the Star		Project No. 101752
Location	NPK MP		Date 8-7-19
Sampling Personnel	ALF, CAB		Well WWIG-D
Weather Conditions	ain Air	Temp. (°F) 6()s	Time started <u>14:10</u> Time completed <u>14:25</u>
	Jot Sampled	1	
Sample No. THU	210-01-	Time /	
Duplicate	1	Time	
Equipment Blank		Time	
Dimm	1		
Pump	the / dedicated pump	Disease	7" All
Purging Method pone	The T dedicated pump	Diamete Approximate Total Donth	of Mall Balaw MD (ft)
Purgo Poto (gol (min))	<u></u>	Approximate Total Depth	
Purpeira End		Measured Total Depth	or well Below MP (ft.) (1.40)
		Depth to log (if	(Water Below MP (ft.) 5.37
Burn Sat Donth Balan MD	154 > /	Depth to Ice (If	
Fump Set Depth Below MP	(fit.)		Feet of Water in Well 8-, 11
TruPoly Tubing	(11.)		Gallons per foot 0,1+
	((1.)	Burg	
	1	Purge	e water volume (gal.)
1	~~~ ~ ~ /	Purge vvater Disposal	
Wonument Condition	se in ground	, lot L Polt.	tabs broken.
Casing Condition	ing casing tri	Casing spun, rain with dril	ised, and lowered
Wiring Condition/ (dedicated pumps)	rla		
Measuring Point (MP) <u>Top o</u>	F Casing (TOC) pre-cut post-cut Me	Monument type: Stick asurement method: Rod	up Flushmoun & level / ape measure
Top-of-casing to monument	(ft) 0.20 B33	Datalogo	ertype n/a
Monument to ground surface	(ft.) 0.00 0.02	Datalogge	serial # n/a
monument to ground surface	(11.)	Measured cable len	ath (ft) n/a
- Lock procept and a	porational	Measured Cable len	
Well pame legible			
Evidence of frost-ja	acking	g wt 0.13'	
Notes Sheen i	n well. Not	sampled.	
	WELL CAS		

CMT	11/4	/ 2 /	3	4	6	8	
0.000253	0.08	0.17	0.38	0.66	1.5	2.6	
	CMT 0.000253	CMT 1¼ 0.000253 0.08	CMT 1¼ 2 0.000253 0.08 0.17	CMT 1¼ 2 3 0.000253 0.08 0.17 0.38	CMT 1¼ 2 3 4 0.000253 0.08 0.17 0.38 0.66	CMT 1¼ 2 3 4 6 0.000253 0.08 0.17 0.38 0.66 1.5	

Well No. MW10-01

Field	Paramete Sample C	r Instrument	Circle one:	Parameter: //	s stabilized or	>3 well volumes purged
1.1	Sample C	Notes	Vot Samel	od.	(2) 1 (d d a)	
14		FIE	LD PARAMETERS [st	abilization of	criteria]	4.A
Time	Temp. (°C)	Dissolved Oxygen (mg/L) [± 0.1 mg/L]	Conductivity (µS/cm) [± 3%]	рН [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
/						
						/
				/		
				/		1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1
	-		\rightarrow			
				<hr/>		1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.
		1	/			
< .		/				
		/				
		/				
		1		1		
	/					
	11- X				1	
				1		
				α.		N

Laboratory SGS



Well No.

Owner/Client _ Location _	Petro Star NPR Date 8-7-19
Sampling Personnel _ Weather Conditions _	ALF, CAB Well MW(0-02 Rann Air Temp. (°F) 60s Time started 14:30 Time completed 14:45 Time completed 14:45
Sample No _ Duplicate _ Equipment Blank _	No Sample Time / Time / Time /
Pump _ Purging Method _ Pumping Start _ Purge Rate (gal./min.) _ Pumping End _ Pump Set Depth Belo KuriTec T TruPoly T	portable / dedicated pump Diameter and Type of Casing 2" PVC Approximate Total Depth of Well Below MP (ft.)
Monument Condition	Loose in ground, Not secure
Casing Condition	Cut casing. Pre-cut: 0.19; Post-cut: 0.29
Wiring Condition (dedicated pumps)	Na
Measuring Point (MP)	Top of Casing (TOC) Monument type: Stickup Flushmount (0.19) precedet Measurement method: Rod & level / Tape measure
Top-of-casing to monu Monument to ground su	ment (ft.) 0.29 Datalogger type n/a rface (ft.) Datalogger serial # n/a Measured cable length (ft.) n/a
 □ Lock present □ Well name le □ Evidence of f 	and operational gible on outside of well irost-jacking <u>See note on casing</u>
Notes She	en in well. Not sampled.
	WELL CASING VOLUMES
Diameter of Well [ID-inches]	CMT 11/4 2 3 4 6 8

Gallons per lineal foot

0.000253

0.08

0.17

0.38

0.66

1.5

2.6

Time	Temp. (°C)	Dissolved Oxygen (mg/L) [± 0.1 mg/L]	Conductivity (µS/cm) [± 3%]	рН [± 0.1]	ORP (mV) [± 10 mV]	Water Clarity (visual)
7 A				/		
						\
	-					
		1			4	
					91	

No.

Well No. MWO-02

Appendix C

Groundwater Gradient Data Summary

Date	Location	Northing (feet)	Easting (feet)	Top-of-Casing Elevation (feet)	Depth to Water (feet)	Groundwater Elevation (feet)
9/4/2019	MW10-01	3924520.48	1430152.12	498.59	4.51	494.08
9/4/2019	MW10-02	3924502.44	1430130.31	498.65	4.55	494.10
9/4/2019	MW10-03	3924560.84	1430076.97	498.56	4.53	494.03
9/4/2019	MW15-1	3924324.66	1430398.67	499.28	4.93	494.35
9/4/2019	MW15-2	3924342.22	1430400.99	499.18	4.84	494.34
9/4/2019	MW15-3	3924367.80	1430412.30	498.82	4.53	494.29
9/4/2019	MW15-4	3924367.32	1430371.91	499.54	5.27	494.27
9/4/2019	MW19-01	3924526.70	1430175.81	498.36	4.27	494.09
9/4/2019	MW19-02	3924487.53	1430091.31	499.06	4.94	494.12
9/4/2019	MW19-03	3924336.67	1430424.78	498.63	4.30	494.33
9/4/2019	MW19-04	3924288.81	1430417.67	498.99	4.60	494.39

Groundwater Gradient Calculation Data: Entire Site

NOTES:

Vertical coordinate information is referenced to the North American Datum of 1988 (NAVD 88).

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83) State Plane Coordinate System Alaska Zone 3.

Groundwater Gradient Calculation Data: Entire Site

Save Data Site Name Date Calculation basis Coordinates ft .D. 1) MW 10-01 2) MW 10-02 3) MW 10-03 4) MW 15-1 5) MW 15-2 6) MW 15-3 7) MW 15-4 8) MW 19-01 9) MW 19-02	Recall Data Petro Star Re 9/4/2019 Head x-coordinate 1430152.12 1430130.31 1430076.97 1430398.67 1430400.99 1430412.30 1430371.91 	Go Back efinery 	Current atehead 48 494. 44 494. 84 494.	Date ft
Site Name Date Calculation basis Coordinates ft .D. 1) MW 10-01 2) MW 10-02 3) MW 10-03 4) MW 15-1 5) MW 15-2 6) MW 15-3 7) MW 15-4 8) MW 19-01 9) MW 19-02	Petro Star Re 9/4/2019 Head ×-coordinate 1430152.12 1430130.31 1430076.97 1430398.67 1430400.99 1430412.30 1430371.91	efinery ey-coordina 3924520.4 3924502.4 3924560. 3924324. 3924342.1	Current atehead 48 494. 44 494. 84 494.	Date ft - 08 10 03
Date Calculation basis Coordinates ft .D. 1) MW 10-01 2) MW 10-02 3) MW 10-03 4) MW 15-1 5) MW 15-2 6) MW 15-3 7) MW 15-4 8) MW 19-01 9) MW 19-02	9/4/2019 Head ×-coordinate 1430152.12 1430130.31 1430076.97 1430398.67 1430400.99 1430412.30 1430371.91	v-coordina 3924520.4 3924502.4 3924502.4 3924560. 3924324.4 3924324.4	Current atehead 48 494. 44 494. 84 494.	Date ft - 08 10 03
Calculation basis Coordinates ft .D. 1) MW 10-01 2) MW 10-02 3) MW 10-03 4) MW 15-1 5) MW 15-2 6) MW 15-3 7) MW 15-4 8) MW 19-01 9) MW 19-02	Head x-coordinate 1430152.12 1430130.31 1430076.97 1430398.67 1430400.99 1430412.30 1430371.91	v-coordina 3924520.4 3924502.4 3924560. 3924324. 3924324.	atehead 48 494. 44 494. 84 494.	ft - 08 10 03
Coordinates ft .D. 1) MW 10-01 2) MW 10-02 3) MW 10-03 4) MW 15-1 5) MW 15-2 6) MW 15-3 7) MW 15-4 8) MW 19-01 9) MW 19-02	x-coordinate 1430152.12 1430130.31 1430076.97 1430398.67 1430400.99 1430412.30 1430371.91	y-coordina 3924520.4 3924502.4 3924560. 3924324. 3924324.	ate _{head} 48 494. 44 494. 84 494.	ft - 08 10 03
D. 1) MW 10-01 2) MW 10-02 3) MW 10-03 4) MW 15-1 5) MW 15-2 6) MW 15-3 7) MW 15-4 8) MW 19-01 9) MW 19-02	x-coordinate 1430152.12 1430130.31 1430076.97 1430398.67 1430400.99 1430412.30 1430371.91	ay-coordina 3924520.4 3924502.4 3924560. 3924324.4 3924342.2	atehead 48 494, 44 494, 84 494,	ft - 08 10 03
 MW 10-01 MW 10-02 MW 10-03 MW 15-1 MW 15-2 MW 15-3 MW 15-4 MW 19-01 MW 19-02 	1430152.12 1430130.31 1430076.97 1430398.67 1430400.99 1430412.30 1430371.91	3924520.4 3924502.4 3924560. 3924324. 3924324.2	18 494. 14 494. 84 494.	08 10 03
 MW 10-02 MW 10-02 MW 10-03 MW 15-1 MW 15-2 MW 15-3 MW 15-4 MW 19-01 MW 19-02 	1430130.31 1430076.97 1430398.67 1430400.99 1430412.30 1430371.91	3924502.4 3924560. 3924324.4 3924324.4	44 494. 84 494.	10 03
 3) MW 10-03 4) MW 15-1 5) MW 15-2 6) MW 15-3 7) MW 15-4 8) MW 19-01 9) MW 19-02 	1430076.97 1430398.67 1430400.99 1430412.30 1430371.91	3924560. 3924324. 392 <mark>4</mark> 342.2	84 494.	03
 4) MW 15-1 5) MW 15-2 6) MW 15-3 7) MW 15-4 8) MW 19-01 9) MW 19-02 	1430398.67 1430400.99 1430412.30 1430371.91	3924324. 3924342.2		
 5) MW 15-2 6) MW 15-3 7) MW 15-4 8) MW 19-01 9) MW 19-02 	1430400.99 1430412.30 1430371.91	3924342.2	66 494.	35
 6) MW 15-3 7) MW 15-4 8) MW 19-01 9) MW 19-02 	1430412.30 1430371.91		22 494.	34
7) MW 15-4 8) MW 19-01 9) MW 19-02	1430371.91	3924367.	80 494.	29
8) MW 19-01 9) MW 19-02		3924367.	32 494.	27
9) MW 19-02	1430175.81	3924526.	70 494.	09
	1430091.31	3924487.	53 494.	12
10) MW 19-03	1430424.78	3924336.	67 494.	33
11) MW 19-04	1430417.67	3924288.	81 494.	39
12)			-	
13)			1 11	
14)				
15)				
16)	-	2	1	
17)				
18)		i		
19)				
20)				-
21)			1	
22)				_
23)			-	_
24)	-		-	_
25)			-	_
26)	-		_	_
27)			-	_
28)			-	_
29)			-	_
30)				
cesuits	made of the		_	
Number of Points	used in Calcula	tion		11
Max. Difference B	etween Head Va	lues		0.10

Coefficient of Determination (R²)

0.995

Date	Location	Northing (feet)	Easting (feet)	Top-of-Casing Elevation (feet)	Depth to Water (feet)	Groundwater Elevation (feet)
9/4/2019	MW10-01	3924520.48	1430152.12	498.59	4.51	494.08
9/4/2019	MW10-02	3924502.44	1430130.31	498.65	4.55	494.10
9/4/2019	MW10-03	3924560.84	1430076.97	498.56	4.53	494.03
9/4/2019	MW19-01	3924526.70	1430175.81	498.36	4.27	494.09
9/4/2019	MW19-02	3924487.53	1430091.31	499.06	4.94	494.12

Groundwater Gradient Calculation Data: ULSD-release Area

NOTES:

Vertical coordinate information is referenced to the North American Datum of 1988 (NAVD 88).

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83) State Plane Coordinate System Alaska Zone 3.

Groundwater Gradient Calculation Data: ULSD-release Area

Example Data Set	1 Example Data	Set 2 C	alculate Clea			
Save Data	Recall Data Go Back					
Site Name	Petro Star NP	Petro Star NPR				
Date	9/4/2019	C	urrent Date			
Calculation basis	Head	~				
Coordinates ft N	/					
I.D.	x-coordinate	y-coordinat	e head ft			
1) MW 10-01	1430152.12	3924520.4	8 494.08			
2) MW 10-02	1430130.31	3924502.4	4 494.10			
3) MW 10-03	1430076.97	3924560.8	4 494.03			
4) MW 19-01	1430175.81	3924526.7	0 494.09			
5) MW 19-02	1430091.31	3924487.5	3 494.12			
6)						
7)			1.1			
8)			-			
9)		1				
10)	1		-			
11)						
12)						
13)						
14)						
15)			-			
16)			-			
17)						
18)						
19)						
20)			-			
21)						
22)						
23)	1	1.1				
24)	1					
25)						
26)						
27)						
28)						
29)						
30)			1			
Results	· ·					

Number of Points used in Calculation	2
Max. Difference Between Head Values	0.02743
Gradient Magnitude (i)	0.001157
Flow direction as degrees from North (positive y axis)	352.9
Coefficient of Determination (R ²)	0.971

Date	Location	Northing (feet)	Easting (feet)	Top-of-Casing Elevation (feet)	Depth to Water (feet)	Groundwater Elevation (feet)
9/4/2019	MW15-1	3924324.66	1430398.67	499.28	4.93	494.35
9/4/2019	MW15-2	3924342.22	1430400.99	499.18	4.84	494.34
9/4/2019	MW15-3	3924367.80	1430412.30	498.82	4.53	494.29
9/4/2019	MW15-4	3924367.32	1430371.91	499.54	5.27	494.27
9/4/2019	MW19-03	3924336.67	1430424.78	498.63	4.30	494.33
9/4/2019	MW19-04	3924288.81	1430417.67	498.99	4.60	494.39

Groundwater Gradient Calculation Data: Gasoline-release Area

NOTES:

Vertical coordinate information is referenced to the North American Datum of 1988 (NAVD 88).

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83) State Plane Coordinate System Alaska Zone 3.

Groundwater Gradient Calculation Data: Gasoline-release Area

Exa	mple Data Set	Example Data	Set 2 Cal	culate Clear
Save Data		Recall Data G	o Back	
Site	Name			
Date			Cur	rent Date
Cale	culation basis	Head	~	
Coc	ordinates ft v	-		
I.D.		x-coordinate	y-coordinate	head ft V
1)	MW 15-1	1430398.67	3924324.66	494.35
2)	MW 15-2	1430400.99	3924342.22	494.34
3)	MW 15-3	1430412.30	3924367.80	494.29
4)	MW 15-4	1430371.91	3924367.32	494.27
5)	MW 19-03	1430424.78	3924336.67	494.33
6)	MW 19-04	1430417.67	3924288.81	494.39
7)		1		
8)				
9)	-			
10)	-	-	_	
11)	2	0		
12)	1	1.11.11.11		
13)		-		
14)				
15)				
16)				
17)		1		
18)	-	1		
19)	-			
20)				
21)		-		
22)				
23)		-		
24)				
25)		-		
20)				
28)			-	-
20)		-		
30)			-	
Res	ults			
Nue	mber of Points	Ised in Calcula	tion	E
Max Difference Retween Head Values				
Cradient Magnitude (i)				
Flow direction as degrees from North (positive v avis)				
Coefficient of Determination (P2)				

APPENDIX D: ANALYTICAL LABORATORY REPORTS AND ADEC LDRC

Appendix D

Analytical Laboratory Reports and ADEC Laboratory Data Review Checklists



Laboratory Report of Analysis

To: Shannon & Wilson-Fairbanks 2355 Hill Road Fairbanks, AK 99709 (907)749-0600

Report Number: **1199566**

Client Project: 101752 Petro Star NPR

Dear Andrew Frick,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of ten years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of fourteen (14) days from the date of this report unless other archiving requirements were included in the quote.

If there are any questions about the report or services performed during this project, please call Jennifer at (907) 562-2343. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely, SGS North America Inc.	Stephen C. Ede Alaska Division Technical Director	Stephen C. Ede 2019.08.09 08:15:39 -08'00'
Jennifer Dawkins Project Manager Jennifer.Dawkins@sgs.com	Date	

Print Date: 08/08/2019 4:35:19PM

SGS North America Inc.

200 West Potter Drive, Anchorage, AK 99518 t 907.562.2343 f 907.561.5301 www.us.sgs.com Results via Engage

Member of SGS Group



Case Narrative

SGS Client: Shannon & Wilson-Fairbanks SGS Project: 1199566 Project Name/Site: 101752 Petro Star NPR

Refer to sample receipt form for information on sample condition.

* QC comments may be associated with the field samples found in this report. When applicable, comments will be applied to the associated field samples.


	Report o	f Manual Integratior	IS	
Laboratory ID	<u>Client Sample ID</u>	Analytical Batch	Analyte	Reason
8270D SIM LV (F	PAH)			
1199566001	TWP19-01	XMS11581	Acenaphthene	SP
1199566002	TWP19-101	XMS11581	Acenaphthene	SP

Manual Integration Reason Code Descriptions

Code Description

- O Original Chromatogram
- M Modified Chromatogram
- SS Skimmed surrogate
- BLG Closed baseline gap
- RP Reassign peak name
- PIR Pattern integration required
- IT Included tail
- SP Split peak
- RSP Removed split peak
- FPS Forced peak start/stop
- BLC Baseline correction
- PNF Peak not found by software

All DRO/RRO analysis are integrated per SOP.

Print Date: 08/08/2019 4:35:21PM



Laboratory Qualifiers

Enclosed are the analytical results associated with the above work order. The results apply to the samples as received. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. This document is issued by the Company under its General Conditions of Service accessible at <<u>http://www.sgs.com/en/Terms-and-Conditions.aspx></u>. Attention is drawn to the limitation of liability, indenmification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the context or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & 17-021 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8015C, 8021B, 8082A, 8260C, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). SGS is only certified for the analytes listed on our Drinking Water Certification, and only those analytes will be reported to the State of Alaska for compliance. Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
В	Indicates the analyte is found in a blank associated with the sample.
CCV/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing Continuing Calibration Verification
CL	Control Limit
DF	Analytical Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LLQC/LLIQC	Low Level Quantitation Check
LOD	Limit of Detection (i.e., 1/2 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.
Sample summaries which ir All DRO/RRO analyses are	nclude a result for "Total Solids" have already been adjusted for moisture content. integrated per SOP.

Print Date: 08/08/2019 4:35:22PM

Note:

200 West Potter Drive, Anchorage, AK 99518 t 907.562.2343 f 907.561.5301 www.us.sgs.com



AK101

SW8260C

	S	Sample Summary		
<u>Client Sample ID</u> TWP19-01 TWP19-101 TWP19-02 Trip Blank	<u>Lab Sample ID</u> 1199566001 1199566002 1199566003 1199566004	<u>Collected</u> 07/25/2019 07/25/2019 07/25/2019 07/25/2019	<u>Received</u> 07/27/2019 07/27/2019 07/27/2019 07/27/2019	<u>Matrix</u> Water (Surface, Eff., Ground) Water (Surface, Eff., Ground) Water (Surface, Eff., Ground) Water (Surface, Eff., Ground)
<u>Method</u> 8270D SIM LV (PAH) SW8260C AK102	<u>Method Des</u> 8270 PAH S BTEX 8260 DRO Low V	<u>cription</u> SIM GC/MS Liq/Lic w/Naphthalene (V olume (W)	∣ext. LV V)	

Gasoline Range Organics (W) Volatile Organic Compounds (W)

Print Date: 08/08/2019 4:35:23PM



Detectable	Results	Summary
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Client Sample ID: TWP19-01			
Lab Sample ID: 1199566001	<u>Parameter</u>	Result	<u>Units</u>
Polynuclear Aromatics GC/MS	Acenaphthene	0.0884	ug/L
	Fluorene	0.326	ug/L
Semivolatile Organic Fuels	Diesel Range Organics	1.37	mg/L
Volatile Fuels	Gasoline Range Organics	0.0767J	mg/L
Volatile GC/MS	Benzene	22.6	ug/L
	Ethylbenzene	0.400J	ug/L
Client Sample ID: TWP19-101			
Lab Sample ID: 1199566002	<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Polynuclear Aromatics GC/MS	Acenaphthene	0.0804	ug/L
	Fluorene	0.302	ug/L
Semivolatile Organic Fuels	Diesel Range Organics	0.819	mg/L
Volatile Fuels	Gasoline Range Organics	0.0850J	mg/L
Volatile GC/MS	Benzene	23.5	ug/L
	Ethylbenzene	0.410J	ug/L
Client Sample ID: TWP19-02			
Lab Sample ID: 1199566003	<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Volatile Fuels	Gasoline Range Organics	0.0956J	mg/L
Volatile GC/MS	Benzene	0.270J	ug/L
	P & M -Xylene	1.28J	ug/L
	Xylenes (total)	1.28J	ug/L

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Results of TWP19-01

Client Sample ID: **TWP19-01** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199566001 Lab Project ID: 1199566 Collection Date: 07/25/19 16:03 Received Date: 07/27/19 10:21 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Polynuclear Aromatics GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	DF	Limits	Date Analyzed
1-Methylnaphthalene	0.0236 U	0.0472	0.0142	ug/L	1		07/30/19 17:29
2-Methylnaphthalene	0.0236 U	0.0472	0.0142	ug/L	1		07/30/19 17:29
Acenaphthene	0.0884	0.0472	0.0142	ug/L	1		07/30/19 17:29
Acenaphthylene	0.0236 U	0.0472	0.0142	ug/L	1		07/30/19 17:29
Anthracene	0.0236 U	0.0472	0.0142	ug/L	1		07/30/19 17:29
Benzo(a)Anthracene	0.0236 U	0.0472	0.0142	ug/L	1		07/30/19 17:29
Benzo[a]pyrene	0.00945 U	0.0189	0.00585	ug/L	1		07/30/19 17:29
Benzo[b]Fluoranthene	0.0236 U	0.0472	0.0142	ug/L	1		07/30/19 17:29
Benzo[g,h,i]perylene	0.0236 U	0.0472	0.0142	ug/L	1		07/30/19 17:29
Benzo[k]fluoranthene	0.0236 U	0.0472	0.0142	ug/L	1		07/30/19 17:29
Chrysene	0.0236 U	0.0472	0.0142	ug/L	1		07/30/19 17:29
Dibenzo[a,h]anthracene	0.00945 U	0.0189	0.00585	ug/L	1		07/30/19 17:29
Fluoranthene	0.0236 U	0.0472	0.0142	ug/L	1		07/30/19 17:29
Fluorene	0.326	0.0472	0.0142	ug/L	1		07/30/19 17:29
Indeno[1,2,3-c,d] pyrene	0.0236 U	0.0472	0.0142	ug/L	1		07/30/19 17:29
Naphthalene	0.0471 U	0.0943	0.0292	ug/L	1		07/30/19 17:29
Phenanthrene	0.0236 U	0.0472	0.0142	ug/L	1		07/30/19 17:29
Pyrene	0.0236 U	0.0472	0.0142	ug/L	1		07/30/19 17:29
Surrogates							
2-Methylnaphthalene-d10 (surr)	69.4	47-106		%	1		07/30/19 17:29
Fluoranthene-d10 (surr)	84.5	24-116		%	1		07/30/19 17:29

Batch Information

Analytical Batch: XMS11581 Analytical Method: 8270D SIM LV (PAH) Analyst: BMZ Analytical Date/Time: 07/30/19 17:29 Container ID: 1199566001-C Prep Batch: XXX41872 Prep Method: SW3520C Prep Date/Time: 07/29/19 14:15 Prep Initial Wt./Vol.: 265 mL Prep Extract Vol: 1 mL

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Results of TWP19-01							
Client Sample ID: TWP19-01 Client Project ID: 101752 Petro Star NPR Lab Sample ID: 1199566001 Lab Project ID: 1199566		Collection Date: 07/25/19 16:03 Received Date: 07/27/19 10:21 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:					
Results by Semivolatile Organic Fuels	S					Allowable	
<u>Parameter</u>	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	DF	Limits	Date Analyzed
Diesel Range Organics	1.37	0.566	0.170	mg/L	1		08/07/19 02:01
Surrogates							
5a Androstane (surr)	73.1	50-150		%	1		08/07/19 02:01
Batch Information							
Analytical Batch: XFC15223			Prep Batch:	XXX41941			
Analytical Method: AK102			Prep Method Prep Date/Ti	I: SW35200) 19 08:36		
Analytical Date/Time: 08/07/19 02:01			Prep Initial V	vt./Vol.: 265	5 mL		
			Drop Extract				

Print Date: 08/08/2019 4:35:29PM

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Results of TWP19-01							
Client Sample ID: TWP19-01 Client Project ID: 101752 Petro Star NPR Lab Sample ID: 1199566001 Lab Project ID: 1199566		C R M S	Collection Date: 07/25/19 16:0 Received Date: 07/27/19 10:2 Matrix: Water (Surface, Eff., Gr Solids (%): Location:			3 1 ound)	
Results by Volatile Fuels			_				
Parameter Gasoline Range Organics	<u>Result Qual</u> 0.0767 J	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> Limits	<u>Date Analyzed</u> 08/05/19 17:37
Surrogates							
4-Bromofluorobenzene (surr)	98.1	50-150		%	1		08/05/19 17:37
Batch Information							
Analytical Batch: VFC14866 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/05/19 17:37 Container ID: 1199566001-E			Prep Batch: Prep Method: Prep Date/Tir Prep Initial W Prep Extract	VXX34591 : SW5030E me: 08/05/ [,] /t./Vol.: 5 m Vol: 5 mL	3 19 06:00 hL		

Print Date: 08/08/2019 4:35:29PM

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Results of TWP19-01

SG

Client Sample ID: **TWP19-01** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199566001 Lab Project ID: 1199566

Collection Date: 07/25/19 16:03 Received Date: 07/27/19 10:21 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	Limits	Date Analyzed
Benzene	22.6	0.400	0.120	ug/L	1		08/05/19 19:14
Ethylbenzene	0.400 J	1.00	0.310	ug/L	1		08/05/19 19:14
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/05/19 19:14
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/05/19 19:14
Toluene	0.500 U	1.00	0.310	ug/L	1		08/05/19 19:14
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/05/19 19:14
Surrogates							
1,2-Dichloroethane-D4 (surr)	104	81-118		%	1		08/05/19 19:14
4-Bromofluorobenzene (surr)	98.3	85-114		%	1		08/05/19 19:14
Toluene-d8 (surr)	101	89-112		%	1		08/05/19 19:14

Batch Information

Analytical Batch: VMS19266 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/05/19 19:14 Container ID: 1199566001-H Prep Batch: VXX34586 Prep Method: SW5030B Prep Date/Time: 08/05/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/08/2019 4:35:29PM

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Results of TWP19-101

Client Sample ID: **TWP19-101** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199566002 Lab Project ID: 1199566 Collection Date: 07/25/19 15:53 Received Date: 07/27/19 10:21 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Polynuclear Aromatics GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	<u>DF</u>	Limits	Date Analyzed
1-Methylnaphthalene	0.0245 U	0.0490	0.0147	ug/L	1		07/30/19 17:49
2-Methylnaphthalene	0.0245 U	0.0490	0.0147	ug/L	1		07/30/19 17:49
Acenaphthene	0.0804	0.0490	0.0147	ug/L	1		07/30/19 17:49
Acenaphthylene	0.0245 U	0.0490	0.0147	ug/L	1		07/30/19 17:49
Anthracene	0.0245 U	0.0490	0.0147	ug/L	1		07/30/19 17:49
Benzo(a)Anthracene	0.0245 U	0.0490	0.0147	ug/L	1		07/30/19 17:49
Benzo[a]pyrene	0.00980 U	0.0196	0.00608	ug/L	1		07/30/19 17:49
Benzo[b]Fluoranthene	0.0245 U	0.0490	0.0147	ug/L	1		07/30/19 17:49
Benzo[g,h,i]perylene	0.0245 U	0.0490	0.0147	ug/L	1		07/30/19 17:49
Benzo[k]fluoranthene	0.0245 U	0.0490	0.0147	ug/L	1		07/30/19 17:49
Chrysene	0.0245 U	0.0490	0.0147	ug/L	1		07/30/19 17:49
Dibenzo[a,h]anthracene	0.00980 U	0.0196	0.00608	ug/L	1		07/30/19 17:49
Fluoranthene	0.0245 U	0.0490	0.0147	ug/L	1		07/30/19 17:49
Fluorene	0.302	0.0490	0.0147	ug/L	1		07/30/19 17:49
Indeno[1,2,3-c,d] pyrene	0.0245 U	0.0490	0.0147	ug/L	1		07/30/19 17:49
Naphthalene	0.0490 U	0.0980	0.0304	ug/L	1		07/30/19 17:49
Phenanthrene	0.0245 U	0.0490	0.0147	ug/L	1		07/30/19 17:49
Pyrene	0.0245 U	0.0490	0.0147	ug/L	1		07/30/19 17:49
Surrogates							
2-Methylnaphthalene-d10 (surr)	65.1	47-106		%	1		07/30/19 17:49
Fluoranthene-d10 (surr)	80.1	24-116		%	1		07/30/19 17:49

Batch Information

Analytical Batch: XMS11581 Analytical Method: 8270D SIM LV (PAH) Analyst: BMZ Analytical Date/Time: 07/30/19 17:49 Container ID: 1199566002-C Prep Batch: XXX41872 Prep Method: SW3520C Prep Date/Time: 07/29/19 14:15 Prep Initial Wt./Vol.: 255 mL Prep Extract Vol: 1 mL

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Results of TWP19-101							
Client Sample ID: TWP19-101 Client Project ID: 101752 Petro Star N Lab Sample ID: 1199566002 Lab Project ID: 1199566	PR	C F M S L	Collection Da Received Da Matrix: Wate Solids (%): ocation:	ate: 07/25/ ite: 07/27/ [.] r (Surface,	19 15:53 19 10:21 Eff., Gro	und)	
Results by Semivolatile Organic Fuels	3		_				
<u>Parameter</u> Diesel Range Organics	<u>Result Qual</u> 0.819	<u>LOQ/CL</u> 0.605	<u>DL</u> 0.181	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> <u>Limits</u>	Date Analyzed 08/07/19 02:10
Surrogates							
5a Androstane (surr)	77.1	50-150		%	1		08/07/19 02:10
Batch Information							
Analytical Batch: XFC15223 Analytical Method: AK102 Analyst: VDL			Prep Batch: Prep Method Prep Date/Ti Prep Initial W	XXX41941 I: SW3520C me: 08/06/1 /t./Vol.: 248	; 9 08:36 mL		

Print Date: 08/08/2019 4:35:29PM

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Results of TWP19-101 Client Sample ID: TWP19-101 Client Project ID: 101752 Petro Star NPR Lab Sample ID: 1199566002 Lab Project ID: 1199566							
		C R M S L	ollection Da eceived Da latrix: Water olids (%): ocation:	llection Date: 07/25/19 15:53 ceived Date: 07/27/19 10:21 trix: Water (Surface, Eff., Ground) lids (%): cation:			
Results by Volatile Fuels			_				
Parameter Gasoline Range Organics	<u>Result Qual</u> 0.0850 J	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> <u>Limits</u>	<u>Date Analyze</u> 08/07/19 14::
u rrogates 4-Bromofluorobenzene (surr)	110	50-150		%	1		08/07/19 14::
Batch Information							
Analytical Batch: VFC14869 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/07/19 14:20 Container ID: 1199566002-F			Prep Batch: Prep Method: Prep Date/Tir Prep Initial W Prep Extract	VXX34606 SW5030E me: 08/07/ ⁻ 't./Vol.: 5 m Vol: 5 mL	3 19 06:00 1L		

J flagging is activated

Results of TWP19-101

Client Sample ID: **TWP19-101** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199566002 Lab Project ID: 1199566

Collection Date: 07/25/19 15:53 Received Date: 07/27/19 10:21 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	<u>DF</u>	Limits	Date Analyzed
Benzene	23.5	0.400	0.120	ug/L	1		08/05/19 19:29
Ethylbenzene	0.410 J	1.00	0.310	ug/L	1		08/05/19 19:29
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/05/19 19:29
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/05/19 19:29
Toluene	0.500 U	1.00	0.310	ug/L	1		08/05/19 19:29
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/05/19 19:29
Surrogates							
1,2-Dichloroethane-D4 (surr)	105	81-118		%	1		08/05/19 19:29
4-Bromofluorobenzene (surr)	101	85-114		%	1		08/05/19 19:29
Toluene-d8 (surr)	99.3	89-112		%	1		08/05/19 19:29

Batch Information

Analytical Batch: VMS19266 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/05/19 19:29 Container ID: 1199566002-H Prep Batch: VXX34586 Prep Method: SW5030B Prep Date/Time: 08/05/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/08/2019 4:35:29PM

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Results of TWP19-02							
Client Sample ID: TWP19-02 Client Project ID: 101752 Petro Star Lab Sample ID: 1199566003 Lab Project ID: 1199566	C R M S	ollection Da eceived Da latrix: Water olids (%): ocation:	ate: 07/25/ te: 07/27/ r (Surface,	/19 18:15 19 10:21 Eff., Gro	und)		
Results by Volatile Fuels			_				
Parameter Gasoline Range Organics	<u>Result Qual</u> 0.0956 J	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> Limits	<u>Date Analyzed</u> 08/07/19 14:3
Surrogates							
4-Bromofluorobenzene (surr)	87.9	50-150		%	1		08/07/19 14:3
Batch Information							
Analytical Batch: VFC14869 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/07/19 14:38 Container ID: 1199566003-E			Prep Batch: Prep Method Prep Date/Tir Prep Initial W Prep Extract	VXX34606 : SW5030E me: 08/07/ /t./Vol.: 5 m Vol: 5 mL	3 19 06:00 hL		

Print Date: 08/08/2019 4:35:29PM

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Results of TWP19-02

SG:

Client Sample ID: TWP19-02
Client Project ID: 101752 Petro Star NPR
Lab Sample ID: 1199566003
Lab Project ID: 1199566

Collection Date: 07/25/19 18:15 Received Date: 07/27/19 10:21 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
<u>Parameter</u>	<u>Result Qual</u>	LOQ/CL	DL	<u>Units</u>	DF	<u>Limits</u>	Date Analyzed
Benzene	0.270 J	0.400	0.120	ug/L	1		08/05/19 19:45
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/05/19 19:45
Naphthalene	0.500 U	1.00	0.310	ug/L	1		08/05/19 19:45
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/05/19 19:45
P & M -Xylene	1.28 J	2.00	0.620	ug/L	1		08/05/19 19:45
Toluene	0.500 U	1.00	0.310	ug/L	1		08/05/19 19:45
Xylenes (total)	1.28 J	3.00	1.00	ug/L	1		08/05/19 19:45
Surrogates							
1,2-Dichloroethane-D4 (surr)	108	81-118		%	1		08/05/19 19:45
4-Bromofluorobenzene (surr)	100	85-114		%	1		08/05/19 19:45
Toluene-d8 (surr)	99.4	89-112		%	1		08/05/19 19:45

Batch Information

Analytical Batch: VMS19266 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/05/19 19:45 Container ID: 1199566003-D Prep Batch: VXX34586 Prep Method: SW5030B Prep Date/Time: 08/05/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/08/2019 4:35:29PM

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Results by Volatile Fuels Parameter Result Qual Gasoline Range Organics 0.0500 U	LOQ/CL					
Gasoline Range Organics 0.0500 U		DL	<u>Units</u>	<u>DF</u>	<u>Allowable</u> Limits	Date Analy
	0.100	0.0310	mg/L	1		08/05/19 12
Surrogates						
4-Bromofluorobenzene (surr) 69.7	50-150		%	1		08/05/19 12
Batch Information						
Analytical Batch: VFC14866 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/05/19 12:17 Container ID: 1199566004-A	F F F F	Prep Batch: N Prep Method: Prep Date/Tin Prep Initial W Prep Extract N	VXX34591 SW5030B ne: 08/05/1 t./Vol.: 5 m Vol: 5 mL	8 19 06:00 L		

Print Date: 08/08/2019 4:35:29PM

J flagging is activated

Results of Trip Blank

Client Sample ID: Trip Blank
Client Project ID: 101752 Petro Star NPR
Lab Sample ID: 1199566004
Lab Project ID: 1199566

Collection Date: 07/25/19 15:53 Received Date: 07/27/19 10:21 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
<u>Parameter</u>	<u>Result Qual</u>	LOQ/CL	DL	<u>Units</u>	<u>DF</u>	Limits	Date Analyzed
Benzene	0.200 U	0.400	0.120	ug/L	1		07/29/19 16:58
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		07/29/19 16:58
Naphthalene	0.500 U	1.00	0.310	ug/L	1		07/29/19 16:58
o-Xylene	0.500 U	1.00	0.310	ug/L	1		07/29/19 16:58
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		07/29/19 16:58
Toluene	0.500 U	1.00	0.310	ug/L	1		07/29/19 16:58
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		07/29/19 16:58
Surrogates							
1,2-Dichloroethane-D4 (surr)	102	81-118		%	1		07/29/19 16:58
4-Bromofluorobenzene (surr)	96.4	85-114		%	1		07/29/19 16:58
Toluene-d8 (surr)	96.7	89-112		%	1		07/29/19 16:58

Batch Information

Analytical Batch: VMS19232 Analytical Method: SW8260C Analyst: NRB Analytical Date/Time: 07/29/19 16:58 Container ID: 1199566004-D Prep Batch: VXX34541 Prep Method: SW5030B Prep Date/Time: 07/29/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/08/2019 4:35:29PM

J flagging is activated

Method Blank

Blank ID: MB for HBN 1797102 [VXX/34541] Blank Lab ID: 1522030

QC for Samples: 1199566004

Results by SW8260C

	D "	1.00/01	DI.	
Parameter	Results	LOQ/CL	DL	Units
Benzene	0.200U	0.400	0.120	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
Naphthalene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	1.00	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	102	81-118		%
4-Bromofluorobenzene (surr)	96.6	85-114		%
Toluene-d8 (surr)	96.5	89-112		%

Batch Information

Analytical Batch: VMS19232 Analytical Method: SW8260C Instrument: VPA 780/5975 GC/MS Analyst: NRB Analytical Date/Time: 7/29/2019 2:30:00PM Prep Batch: VXX34541 Prep Method: SW5030B Prep Date/Time: 7/29/2019 6:00:00AM Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Matrix: Water (Surface, Eff., Ground)

Print Date: 08/08/2019 4:35:31PM

Leaching Blank

Blank ID: LB for HBN 1796968 [TCLP/10157 Blank Lab ID: 1521462

QC for Samples: 1199566004

Results by SW8260C

Parameter	<u>Results</u>	LOQ/CL	<u>DL</u>	<u>Units</u>
Benzene	10.0U	20.0	6.00	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	102	81-118		%
4-Bromofluorobenzene (surr)	96.7	85-114		%
Toluene-d8 (surr)	96.1	89-112		%

Batch Information

Analytical Batch: VMS19232 Analytical Method: SW8260C Instrument: VPA 780/5975 GC/MS Analyst: NRB Analytical Date/Time: 7/29/2019 5:28:00PM Prep Batch: VXX34541 Prep Method: SW5030B Prep Date/Time: 7/29/2019 6:00:00AM Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Matrix: Water (Surface, Eff., Ground)

Print Date: 08/08/2019 4:35:31PM

Leaching Blank

Blank ID: LB for HBN 1797000 [TCLP/10158 Blank Lab ID: 1521571

QC for Samples: 1199566004

Results by SW8260C

Parameter	<u>Results</u>	LOQ/CL	<u>DL</u>	<u>Units</u>
Benzene	10.0U	20.0	6.00	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	102	81-118		%
4-Bromofluorobenzene (surr)	98.2	85-114		%
Toluene-d8 (surr)	96.1	89-112		%

Batch Information

Analytical Batch: VMS19232 Analytical Method: SW8260C Instrument: VPA 780/5975 GC/MS Analyst: NRB Analytical Date/Time: 7/29/2019 5:42:00PM Prep Batch: VXX34541 Prep Method: SW5030B Prep Date/Time: 7/29/2019 6:00:00AM Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Matrix: Water (Surface, Eff., Ground)

Print Date: 08/08/2019 4:35:31PM



Blank Spike Summary

Blank Spike ID: LCS for HBN 1199566 [VXX34541] Blank Spike Lab ID: 1522031 Date Analyzed: 07/29/2019 15:16 Spike Duplicate ID: LCSD for HBN 1199566 [VXX34541] Spike Duplicate Lab ID: 1522032 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199566004

Results by SW8260C

		Blank Spike	e (ug/L)	5	Spike Dupli	cate (ug/L)			
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>	<u>RPD (%)</u>	RPD CL
Benzene	30	28.7	96	30	28.4	95	(79-120)	0.81	(< 20)
Ethylbenzene	30	28.4	95	30	28.3	94	(79-121)	0.37	(< 20)
Naphthalene	30	27.8	93	30	28.2	94	(61-128)	1.70	(< 20)
o-Xylene	30	27.9	93	30	28.0	93	(78-122)	0.16	(< 20)
P & M -Xylene	60	56.9	95	60	57.0	95	(80-121)	0.23	(< 20)
Toluene	30	27.4	91	30	27.4	92	(80-121)	0.28	(< 20)
Xylenes (total)	90	84.8	94	90	85.0	95	(79-121)	0.21	(< 20)
Surrogates									
1,2-Dichloroethane-D4 (surr)	30	98.7	99	30	97.4	97	(81-118)	1.30	
4-Bromofluorobenzene (surr)	30	98.2	98	30	97.8	98	(85-114)	0.37	
Toluene-d8 (surr)	30	98.4	98	30	98.7	99	(89-112)	0.22	

Batch Information

Analytical Batch: VMS19232 Analytical Method: SW8260C Instrument: VPA 780/5975 GC/MS Analyst: NRB Prep Batch: VXX34541 Prep Method: SW5030B Prep Date/Time: 07/29/2019 06:00 Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Print Date: 08/08/2019 4:35:32PM

Method Blank

Blank ID: MB for HBN 1797480 [VXX/34586] Blank Lab ID: 1523572 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199566001, 1199566003

Results by SW8260C LOQ/CL Parameter **Results** DL Units Benzene 0.200U 0.400 0.120 ug/L Ethylbenzene 0.500U 1.00 0.310 ug/L Naphthalene 0.500U 1.00 0.310 ug/L o-Xylene 0.500U 1.00 0.310 ug/L 1.00U P & M -Xylene 2.00 0.620 ug/L Toluene 0.500U 1.00 0.310 ug/L Xylenes (total) 1.50U 3.00 1.00 ug/L Surrogates 1,2-Dichloroethane-D4 (surr) 106 81-118 % 101 % 4-Bromofluorobenzene (surr) 85-114 Toluene-d8 (surr) 100 89-112 %

Batch Information

Analytical Batch: VMS19266 Analytical Method: SW8260C Instrument: Agilent 7890-75MS Analyst: CMC Analytical Date/Time: 8/5/2019 2:22:00PM Prep Batch: VXX34586 Prep Method: SW5030B Prep Date/Time: 8/5/2019 6:00:00AM Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/08/2019 4:35:34PM



Blank Spike Summary

Blank Spike ID: LCS for HBN 1199566 [VXX34586] Blank Spike Lab ID: 1523573 Date Analyzed: 08/05/2019 14:38 Spike Duplicate ID: LCSD for HBN 1199566 [VXX34586] Spike Duplicate Lab ID: 1523574 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199566001, 1199566002, 1199566003

Results by SW8260C

		Blank Spike	e (ug/L)	:	Spike Dupli	cate (ug/L)			
Parameter	Spike	Result	<u>Rec (%)</u>	Spike	Result	<u>Rec (%)</u>	CL	<u>RPD (%)</u>	RPD CL
Benzene	30	28.7	96	30	27.8	93	(79-120)	3.10	(< 20)
Ethylbenzene	30	28.0	93	30	27.5	92	(79-121)	1.70	(< 20)
Naphthalene	30	30.6	102	30	31.6	105	(61-128)	3.30	(< 20)
o-Xylene	30	27.2	91	30	27.3	91	(78-122)	0.33	(< 20)
P & M -Xylene	60	57.2	95	60	56.6	94	(80-121)	1.10	(< 20)
Toluene	30	27.9	93	30	27.3	91	(80-121)	2.20	(< 20)
Xylenes (total)	90	84.4	94	90	83.9	93	(79-121)	0.62	(< 20)
Surrogates									
1,2-Dichloroethane-D4 (surr)	30	99.6	100	30	97.4	97	(81-118)	2.20	
4-Bromofluorobenzene (surr)	30	101	101	30	100	100	(85-114)	0.47	
Toluene-d8 (surr)	30	99.3	99	30	99.3	99	(89-112)	0.00	

Batch Information

Analytical Batch: VMS19266 Analytical Method: SW8260C Instrument: Agilent 7890-75MS Analyst: CMC Prep Batch: VXX34586 Prep Method: SW5030B Prep Date/Time: 08/05/2019 06:00 Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Print Date: 08/08/2019 4:35:35PM

Method Blank							
Blank ID: MB for HBN 1797 Blank Lab ID: 1523736	504 [VXX/34591]	Matrix: Water (Surface, Eff., Ground)					
QC for Samples: 1199566001, 1199566004							
Results by AK101) 					
Parameter Gasoline Range Organics	<u>Results</u> 0.0500U	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L			
Surrogates							
4-Bromofluorobenzene (surr)	66.7	50-150		%			
Batch Information							
Analytical Batch: VFC1486 Analytical Method: AK101 Instrument: Agilent 7890A Analyst: NRB Analytical Date/Time: 8/5/2	Prep Batch: VXX34591 Prep Method: SW5030B Prep Date/Time: 8/5/2019 6:00:00AM Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL						

Print Date: 08/08/2019 4:35:36PM



Blank Spike Summary

Blank Spike ID: LCS for HBN 1199566 [VXX34591] Blank Spike Lab ID: 1523737 Date Analyzed: 08/05/2019 11:42 Spike Duplicate ID: LCSD for HBN 1199566 [VXX34591] Spike Duplicate Lab ID: 1523738 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199566001, 1199566004

Results by AK101			_							
	Blank Spike (mg/L)			S	pike Duplic	cate (mg/L)				
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>	<u>RPD (%)</u>	RPD CL	
Gasoline Range Organics	1.00	0.882	88	1.00	0.870	87	(60-120)	1.40	(< 20)	
Surrogates										
4-Bromofluorobenzene (surr)	0.0500	75.6	76	0.0500	77	77	(50-150)	1.80		
Batch Information										
Analytical Batch: VFC14866				Prep	Batch: V	XX34591				
Analytical Method: AK101				Prep Method: SW5030B						
Instrument: Agilent 7890A Pl	D/FID			Prep Date/Time: 08/05/2019 06:00						
Analyst: NRB				Spik	e Init Wt./\	/ol.: 1.00 mg	g/L Extract \	Vol: 5 mL		
				Dup	e Init Wt./V	′ol.: 1.00 mg	g/L Extract V	ol: 5 mL		

Print Date: 08/08/2019 4:35:37PM

– Method Blank							
Blank ID: MB for HBN 17976 Blank Lab ID: 1524286	32 [VXX/34606]	Matrix: Water (Surface, Eff., Ground)					
QC for Samples: 1199566002, 1199566003							
Results by AK101							
Parameter Gasoline Range Organics	<u>Results</u> 0.0500U	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L			
Surrogates 4-Bromofluorobenzene (surr)	76	50-150		%			
Batch Information							
Analytical Batch: VFC14869 Analytical Method: AK101 Instrument: Agilent 7890 PIE Analyst: NRB Analytical Date/Time: 8/7/20	Prep Batch: VXX34606 Prep Method: SW5030B Prep Date/Time: 8/7/2019 6:00:00AM Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL						

Print Date: 08/08/2019 4:35:40PM



Blank Spike Summary

Blank Spike ID: LCS for HBN 1199566 [VXX34606] Blank Spike Lab ID: 1524287 Date Analyzed: 08/07/2019 13:26 Spike Duplicate ID: LCSD for HBN 1199566 [VXX34606] Spike Duplicate Lab ID: 1524288 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199566002, 1199566003

Results by AK101			_						
	E	Blank Spike	e (mg/L)	S	pike Duplic	cate (mg/L)			
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>	<u>RPD (%)</u>	RPD CL
Gasoline Range Organics	1.00	1.06	106	1.00	0.995	100	(60-120)	6.00	(< 20)
Surrogates									
4-Bromofluorobenzene (surr)	0.0500	88.6	89	0.0500	89.8	90	(50-150)	1.40	
Batch Information									
Analytical Batch: VFC14869				Prep	Batch: V	XX34606			
Analytical Method: AK101				Prep	Method:	SW5030B			
Instrument: Agilent 7890 PID/	FID			Prep	Date/Time	e: 08/07/201	9 06:00		
Analyst: NRB				Spik	e Init Wt./\	/ol.: 1.00 mg	g/L Extract	Vol: 5 mL	
				Dup	e Init Wt./V	/ol.: 1.00 mg	g/L Extract V	ol: 5 mL	

Print Date: 08/08/2019 4:35:41PM



Method Blank

Blank ID: MB for HBN 1797063 [XXX/41872] Blank Lab ID: 1521862 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199566001, 1199566002

Results by 8270D SIM LV (PAH)

Parameter	Results		DI	Units
1-Methylnaphthalene	0.0250U	0.0500	0.0150	ua/L
2-Methylnaphthalene	0.0250U	0.0500	0.0150	ug/L
Acenaphthene	0.0250U	0.0500	0.0150	ug/L
Acenaphthylene	0.0250U	0.0500	0.0150	ua/L
Anthracene	0.0250U	0.0500	0.0150	ug/L
Benzo(a)Anthracene	0.0250U	0.0500	0.0150	ug/L
Benzo[a]pyrene	0.0100U	0.0200	0.00620	ug/L
Benzo[b]Fluoranthene	0.0250U	0.0500	0.0150	ug/L
Benzo[g,h,i]perylene	0.0250U	0.0500	0.0150	ug/L
Benzo[k]fluoranthene	0.0250U	0.0500	0.0150	ug/L
Chrysene	0.0250U	0.0500	0.0150	ug/L
Dibenzo[a,h]anthracene	0.0100U	0.0200	0.00620	ug/L
Fluoranthene	0.0250U	0.0500	0.0150	ug/L
Fluorene	0.0250U	0.0500	0.0150	ug/L
Indeno[1,2,3-c,d] pyrene	0.0250U	0.0500	0.0150	ug/L
Naphthalene	0.0500U	0.100	0.0310	ug/L
Phenanthrene	0.0250U	0.0500	0.0150	ug/L
Pyrene	0.0250U	0.0500	0.0150	ug/L
Surrogates				
2-Methylnaphthalene-d10 (surr)	66.1	47-106		%
Fluoranthene-d10 (surr)	80.5	24-116		%
· · ·				

Batch Information

Analytical Batch: XMS11581 Analytical Method: 8270D SIM LV (PAH) Instrument: SVA Agilent 780/5975 GC/MS Analyst: BMZ Analytical Date/Time: 7/30/2019 3:46:00PM Prep Batch: XXX41872 Prep Method: SW3520C Prep Date/Time: 7/29/2019 2:15:22PM Prep Initial Wt./Vol.: 250 mL Prep Extract Vol: 1 mL

Print Date: 08/08/2019 4:35:42PM

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Blank Spike Summary

Blank Spike ID: LCS for HBN 1199566 [XXX41872] Blank Spike Lab ID: 1521863 Date Analyzed: 07/30/2019 16:07

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199566001, 1199566002

Results by 8270D SIM LV (PAH)

		Blank Spike	e (ug/L)	
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>
1-Methylnaphthalene	2	1.42	71	(41-115)
2-Methylnaphthalene	2	1.41	70	(39-114)
Acenaphthene	2	1.39	70	(48-114)
Acenaphthylene	2	1.47	74	(35-121)
Anthracene	2	1.42	71	(53-119)
Benzo(a)Anthracene	2	1.58	79	(59-120)
Benzo[a]pyrene	2	1.52	76	(53-120)
Benzo[b]Fluoranthene	2	1.56	78	(53-126)
Benzo[g,h,i]perylene	2	1.44	72	(44-128)
Benzo[k]fluoranthene	2	1.56	78	(54-125)
Chrysene	2	1.62	81	(57-120)
Dibenzo[a,h]anthracene	2	1.25	62	(44-131)
Fluoranthene	2	1.63	82	(58-120)
Fluorene	2	1.44	72	(50-118)
Indeno[1,2,3-c,d] pyrene	2	1.65	82	(48-130)
Naphthalene	2	1.47	73	(43-114)
Phenanthrene	2	1.38	69	(53-115)
Pyrene	2	1.69	84	(53-121)
Surrogates				
2-Methylnaphthalene-d10 (surr)	2	65.7	66	(47-106)
Fluoranthene-d10 (surr)	2	78.6	79	(24-116)

Batch Information

Analytical Batch: XMS11581 Analytical Method: 8270D SIM LV (PAH) Instrument: SVA Agilent 780/5975 GC/MS Analyst: BMZ Prep Batch: XXX41872 Prep Method: SW3520C Prep Date/Time: 07/29/2019 14:15 Spike Init Wt./Vol.: 2 ug/L Extract Vol: 1 mL Dupe Init Wt./Vol.: Extract Vol:

Print Date: 08/08/2019 4:35:44PM

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Matrix Spike Summary

Original Sample ID: 1194125001 MS Sample ID: 1521864 MS MSD Sample ID: 1521865 MSD

QC for Samples: 1199566001, 1199566002

Analysis Date: 07/30/2019 16:27 Analysis Date: 07/30/2019 16:48 Analysis Date: 07/30/2019 17:08 Matrix: Water (Surface, Eff., Ground)

Results by 8270D SIM LV (P	AH)									
		Ma	trix Spike ((ug/L)	Spik	e Duplicat	e (ug/L)			
<u>Parameter</u>	Sample	Spike	Result	Rec (%)	Spike	Result	<u>Rec (%)</u>	CL	<u>RPD (%</u>	RPD CL
Acenaphthene	0.0512U	2.17	1.55	71	2.21	1.72	78	48-114	10.60	(< 20)
Acenaphthylene	0.0512U	2.17	1.71	79	2.21	1.92	87	35-121	11.90	(< 20)
Anthracene	0.0512U	2.17	1.52	70	2.21	1.72	78	53-119	12.40	(< 20)
Benzo(a)Anthracene	0.0512U	2.17	1.5	69	2.21	1.68	76	59-120	11.50	(< 20)
Benzo[a]pyrene	0.0205U	2.17	1.21	56	2.21	1.36	62	53-120	11.80	(< 20)
Benzo[b]Fluoranthene	0.0512U	2.17	1.29	59	2.21	1.45	66	53-126	11.90	(< 20)
Benzo[g,h,i]perylene	0.0512U	2.17	1.04	48	2.21	1.27	57	44-128	19.90	(< 20)
Benzo[k]fluoranthene	0.0512U	2.17	1.23	56	2.21	1.38	63	54-125	11.90	(< 20)
Chrysene	0.0512U	2.17	1.52	70	2.21	1.73	78	57-120	12.40	(< 20)
Dibenzo[a,h]anthracene	0.0205U	2.17	.953	44 *	2.21	1.21	55	44-131	23.80	* (< 20)
Fluoranthene	0.0512U	2.17	1.68	77	2.21	1.89	85	58-120	11.50	(< 20)
Fluorene	0.0512U	2.17	1.65	76	2.21	1.82	82	50-118	9.80	(< 20)
Indeno[1,2,3-c,d] pyrene	0.0512U	2.17	1.09	50	2.21	1.33	60	48-130	20.20	* (< 20)
Naphthalene	0.102U	2.17	1.66	76	2.21	1.88	85	43-114	12.30	(< 20)
Phenanthrene	0.0512U	2.17	1.55	71	2.21	1.73	78	53-115	11.50	(< 20)
Pyrene	0.0512U	2.17	1.74	80	2.21	1.98	89	53-121	12.40	(< 20)
Surrogates										
2-Methylnaphthalene-d10 (surr)		2.17	1.47	68	2.21	1.68	76	47-106	13.00	
Fluoranthene-d10 (surr)		2.17	1.55	71	2.21	1.79	81	24-116	14.20	

Batch Information

Analytical Batch: XMS11581 Analytical Method: 8270D SIM LV (PAH) Instrument: SVA Agilent 780/5975 GC/MS Analyst: BMZ Analytical Date/Time: 7/30/2019 4:48:00PM Prep Batch: XXX41872 Prep Method: 3520 Liq/Liq Ext for 8270 PAH SIM LV Prep Date/Time: 7/29/2019 2:15:22PM Prep Initial Wt./Vol.: 230.00mL Prep Extract Vol: 1.00mL

Print Date: 08/08/2019 4:35:44PM

SGS North America Inc.

461 [XXX/41941]	Matrix	:: Water (Surfa	ce, Eff., Ground)	
<u>Results</u>	LOQ/CL	<u>DL</u>	<u>Units</u>	
0.300U	0.600	0.180	mg/L	
82.6	60-120		%	
3	Prep Bat	tch: XXX41941		
	Prep Me	thod: SW35200		
R	Prep Dat Prep Init	te/Time: 8/6/20	19 8:36:09AM	
019 12:34:00AM	Prep Init Prep Ext	ract Vol: 1 mL	/ mL	
	461 [XXX/41941] <u>Results</u> 0.300U 82.6 3 R	461 [XXX/41941] Matrix Results LOQ/CL 0.300U 0.600 82.6 60-120 3 Prep Bat Prep Dat Prep Dat Prep Init Prep Init 0.19, 12:34:00AM Prep Eat	461 [XXX/41941] Matrix: Water (Surfa Results LOQ/CL DL 0.300U 0.600 0.180 82.6 60-120 3 Prep Batch: XXX41941 Prep Method: SW35200 Prep Date/Time: 8/6/20 R Prep Date/Time: 8/6/20 019, 12:34:000M Prep Extract Vol: 1 ml	461 [XXX/41941] Matrix: Water (Surface, Eff., Ground) Results LOQ/CL DL Units 0.300U 0.600 0.180 mg/L 82.6 60-120 % 3 Prep Batch: XXX41941 Prep Date/Time: 8/6/2019 8:36:09AM 0.19, 12:34:00AM Prep Fatact Wol: 1 ml

Print Date: 08/08/2019 4:35:45PM



Blank Spike Summary

Blank Spike ID: LCS for HBN 1199566 [XXX41941] Blank Spike Lab ID: 1523487 Date Analyzed: 08/07/2019 00:43 Spike Duplicate ID: LCSD for HBN 1199566 [XXX41941] Spike Duplicate Lab ID: 1523488 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199566001, 1199566002

Results by AK102									
	Blank Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>	<u>RPD (%)</u>	RPD CL
Diesel Range Organics	20	18.7	94	20	18.0	90	(75-125)	3.80	(< 20)
Surrogates									
5a Androstane (surr)	0.4	89.5	90	0.4	85.4	85	(60-120)	4.70	
Batch Information									
Analytical Batch: XFC15223				Pre	b Batch: X	XX41941			
Analytical Method: AK102				Pre	o Method:	SW3520C			
Instrument: Agilent 7890B R				Pre	o Date/Tim	e: 08/06/201	9 08:36		
Analyst: VDL				Spil	ke Init Wt./\	/ol.: 20 mg/l	L Extract Vo	ol: 1 mL	
				Dup	e Init Wt./\	/ol.: 20 mg/L	Extract Vol	: 1 mL	

Print Date: 08/08/2019 4:35:47PM



No. 411419

e-Sample Receipt Form

000	e-Sam <u>ple R</u>	Receipt For	rm				
202	SGS Workorder #:	119	9566		I I I I I I I I I I	9 5 6	
Rev	iew Criteria	dition (Yes, No, N/A	A	Exception	s Noted b	elow	
<u>Chain of</u>	Custody / Temperature Requireme	ents	N/A Exemp	otion permitted	if sampler hai	nd carries/deliv	/ers.
	Were Custody Seals intact? Note # & location	on Yes 1F 1	В				
DOD: Wate of	COC accompanied samples	s? Yes					
DOD: were sa	**Exemption permitted if chille	d & collected		for samples w	oere chilling is	not required	
Temperatu	re blank compliant* (i.e., 0-6 °C after CE)? Yes Coo	ler ID:	1 (a 3.9	°C Therm. ID:	D5
Tompolata			ler ID:	(0	°C Therm. ID:	
If samples received without a te	mperature blank, the "cooler temperature" will be	Coo	ler ID:	(@	°C Therm. ID:	
ocumented instead & "COOLER TE be not	MP" will be noted to the right. "ambient" or "chilled" v ed if neither is available.	vill Coo	ler ID:	(@	°C Therm. ID:	
		Coo	<mark>ler ID:</mark>	(@	°C Therm. ID:	
*lf >6°	C, were samples collected <8 hours ago	? N/A					
	If <0°C, were sample containers ice free	? N/A					
Note: Identify containe	rs received at non-compliant temperature	9					
U	se form FS-0029 if more space is neede	d.					
Holding Time / De	aumentation / Samula Condition Demuin						
Holding Time / Do	ere samples received within holding time	ements Note:	Refer to form F-08	3 "Sample Guide	for specific hol	ding times.	
Do samples match COC	** (i.e.,sample IDs,dates/times collected))? Yes					
**Note: If times diffe	er <1hr, record details & login per COC.						
*Note: If sample information on cor	tainers differs from COC, SGS will default to COC in	nformation					
Were analytical requests cl	ear? (i.e., method is specified for analyse	es Yes					
with mult	iple option for analysis (Ex: BTEX, Metal	S)					
			***⊑vo	motion parmitte	ad for motolo		
Were proper containers	(type/mass/yolume/preservative***)user					<u>(e.g,200.0/002</u>	<u>UA)</u>
were proper containers	(type/mass/volume/preservative /usec						
	Volatile / LL-Hg Require	ments					
Were Trip Blanks (i	.e., VOAs, LL-Hg) in cooler with samples	s? Yes					
Were all water VOA vials	free of headspace (i.e., bubbles ≤ 6mm)? Yes					
Were all s	oil VOAs field extracted with MeOH+BFE	3? N/A					
Note to Clier	it: Any "No", answer above indicates non-com	pliance with s	standard procedu	ires and may in	npact data qu	ality.	
	Additional not	es (if applic	cable):				

e-Sampl<u>e Receipt Form FBK</u>

000

202	SGS Workorder #:	SGS Workorder #: 119956				199	566	
Review Crit	eria	Condition (Yes	, No, N/A	Exc	eptions No	oted belo	w	
Chain of Custod	y / Temperature Requi	irements	Y	Exemption pe	rmitted if sam	pler hand	carries/deliv	/ers.
Were Cu	stody Seals intact? Note # &	location N/A						
	COC accompanied s	amples? Yes						
DOD: Were samples rec	eived in COC corresponding	coolers? N/A						
L	**Exemption permitted it	f chilled & colle	ected <8 hou	irs ago, or for san	nples where c	hilling is no	ot required	
Temperature blank	compliant* (i.e., 0-6 °C aft	er CF)? Yes	Cooler ID:	1	@	3.6 °C	Therm. ID:	D54
			Cooler ID:		@	°C	Therm. ID:	<u> </u>
ocumented instead & "COOLER TEMP" will be	noted to the right. "ambient" or "c	hilled" will	Cooler ID:		@	°C	Therm. ID:	<u> </u>
be noted if neithe	r is available.		Cooler ID:		@	°C	Therm. ID:	
*/f = 6% - work	amples collected 19 hour							
11 >0 C, were s	amples collected <o nour<="" th=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></o>							
If <0°C	vere sample containers ic	e free?						
1 <0 0, 1	were sample containers ic							
Note: Identify containers receive	ed at non-compliant tempe	rature						
Use form I	S-0029 if more space is r	needed.						
Holding Time / Documenta	tion / Sample Condition R	equirements	Note: Refe	r to form F-083 "S	Sample Guide	for specif	ic holding ti	mes.
Do samples match COC** (i.e.,sa	ample IDs,dates/times coll	ected)? N/C						
**Note: If times differ <1hr, r	ecord details & login per C	COC.						
*Note: If sample information on containers diffe	ers from COC, SGS will default to	COC information	1					
Were samples in good cond	ition (no leaks/cracks/brea	akage)? Yes	ļ					
Were analytical requests clear? (i e	method is specified for a	nalvses						
with multiple optic	on for analysis (Ex: BTEX,	Metals)	l .					
		Yes						
Were Trip Blanks (i.e., VOA	s, LL-Hg) in cooler with sa	imples? Yes						
Were all water VOA vials free of r	leadspace (i.e., bubbles ≤							
were all soll vOAs	Tield extracted with MeOF	1+BFB? N/A						
For Push/Short Hold Time	Was DIICU/Short UI ama							
For Rush/Short Hold Time,	was RUSH/Short HT ema		and the second s		d the set of the set o		iy.	
For Rush/Short Hold Time, Note to Client: Any "N	was RUSH/Short HT ema o", answer above indicates no	on-compliance	with standa	rd procedures and	d may impact	data qualit		
For Rush/Short Hold Time, Note to Client: Any "Note to Client: Any "Note to Client	was RUSH/Short H1 ema o", answer above indicates no Additiona	on-compliance al notes (if a	with standa	rd procedures and	d may impact	data qualit		
For Rush/Short Hold Time, Note to Client: Any "Note	was RUSH/Short HT ema o", answer above indicates no Addition:	al notes (if a	with standa	rd procedures and): ככי	1 may impact			
For Rush/Short Hold Time, Note to Client: Any "No SGS Profile #	was RUSH/Short HT ema o", answer above indicates no Addition: 3379	on-compliance al notes (if a	with standa	rd procedures and : 33	7 9 2 3			



Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container</u> Condition	<u>Container Id</u>	<u>Preservative</u>	<u>Container</u> <u>Condition</u>
1199566001-A	HCL to $pH < 2$	ОК			
1199566001-B	HCL to $pH < 2$	ОК			
1199566001-C	No Preservative Required	ОК			
1199566001-D	No Preservative Required	ОК			
1199566001-E	HCL to $pH < 2$	ОК			
1199566001-F	HCL to $pH < 2$	ОК			
1199566001-G	HCL to pH < 2	ОК			
1199566001-H	HCL to $pH < 2$	ОК			
1199566001-I	HCL to $pH < 2$	ОК			
1199566001-J	HCL to $pH < 2$	ОК			
1199566002-A	HCL to $pH < 2$	ОК			
1199566002-B	HCL to $pH < 2$	ОК			
1199566002-C	No Preservative Required	ОК			
1199566002-D	No Preservative Required	ОК			
1199566002-E	HCL to $pH < 2$	ОК			
1199566002-F	HCL to $pH < 2$	ОК			
1199566002-G	HCL to $pH < 2$	ОК			
1199566002-H	HCL to $pH < 2$	ОК			
1199566002-I	HCL to $pH < 2$	ОК			
1199566002-J	HCL to $pH < 2$	ОК			
1199566003-A	HCL to $pH < 2$	ОК			
1199566003-В	HCL to $pH < 2$	ОК			
1199566003-C	HCL to $pH < 2$	ОК			
1199566003-D	HCL to $pH < 2$	ОК			
1199566003-E	HCL to $pH < 2$	ОК			
1199566003-F	HCL to $pH < 2$	ОК			
1199566004-A	HCL to $pH < 2$	ОК			
1199566004-B	HCL to $pH < 2$	ОК			
1199566004-C	HCL to $pH < 2$	ОК			
1199566004-D	HCL to $pH < 2$	ОК			
1199566004-E	HCL to $pH < 2$	OK			
1199566004-F	HCL to $pH < 2$	ОК			

Container Id

Preservative

<u>Container</u> <u>Condition</u> <u>Container Id</u>

<u>Preservative</u>

Container Condition

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates than an inappropriate container was submitted.

OK - The container was received at an acceptable pH for the analysis requested.

- BU The container was received with headspace greater than 6mm.
- DM The container was received damaged.
- FR The container was received frozen and not usable for Bacteria or BOD analyses.
- IC The container provided for microbiology analysis was not a laboratory-supplied, pre-sterilized container and therefore was not suitable for analysis.

NC- The container provided was not preserved or was under-preserved. The method does not allow for additional preservative added after collection.

PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.
Laboratory Data Review Checklist

Completed By:

Andrew Frick

Title:

Environmental Scientist

Date:

August 28, 2019

CS Report Name:

101752 Petro Star NPR

Report Date:

August 9, 2019

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

SGS North America, Inc.

Laboratory Report Number:

1199566

ADEC File Number:

100.38.102

Hazard Identification Number:

535

1199566

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

• Yes O No Comments: b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved? No O Yes Comments: N/A; all analyses were performed by the SGS laboratory in Anchorage, AK. The laboratory is certified by the ADEC CSP for the requested analyses. 2. Chain of Custody (CoC) a. CoC information completed, signed, and dated (including released/received by)? • Yes O No Comments: b. Correct Analyses requested? • Yes O No Comments: 3. Laboratory Sample Receipt Documentation a. Sample/cooler temperature documented and within range at receipt $(0^{\circ} \text{ to } 6^{\circ} \text{ C})$? • Yes O No Comments: b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)? • Yes O No Comments:

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

Yes	🔿 No	Comments:
····	- 110	comments.

The laboratory noted that samples were received in good condition.

1199566

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

○ Yes • No Comments:

There were no discrepancies noted in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and/or usability are not affected.

4. <u>Case Narrative</u>

a. Present and understandable?

• Yes • No Comments:

b. Discrepancies, errors, or QC failures identified by the lab?

○ Yes ⊙ No Comments:

No discrepancies, errors, or QC failures were noted.

c. Were all corrective actions documented?

🔿 Yes 🛛 💿 No

Comments:

No corrective actions were documented in the case narrative.

d. What is the effect on data quality/usability according to the case narrative?

Comments:

The case narrative did not note any effect on data quality/usability.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

• Yes • No Comments:

b. All applicable holding times met?

• Yes • No Comments:

c. All soils reported on a dry weight basis?

○ Yes ^{(©} No Comments:

N/A; soil samples were not submitted with this work order.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

• Yes • No Comments:

The reported limit of detections (LODs) were below the project-specific DQOs for the requested analytes.

e. Data quality or usability affected?

The data quality and/or usability were not affected; see above.

6. QC Samples

- a. Method Blank
 - i. One method blank reported per matrix, analysis and 20 samples?

• Yes O No Comments:	
----------------------	--

ii. All method blank results less than limit of quantitation (LOQ)?

• Yes O No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; target analytes were not detected in the method blank samples associated with this work order.

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

○ Yes ● No Comments:

N/A; no samples are affected.

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

- b. Laboratory Control Sample/Duplicate (LCS/LCSD)
 - i. Organics One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

○ Yes [®] No Comments:

LCS/LCSD were reported for the GRO, DRO, and BTEX analyses. An LCS and MS/MSD were reported for the PAH analysis.

- ii. Metals/Inorganics one LCS and one sample duplicate reported per matrix, analysis and 20 samples?
- Yes No Comments:

Metal/inorganic analyses were not requested with this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

• Yes • No

Comments:

 iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

O Yes 💿 No

Comments:

The RPD for dibenzo[a,h]anthracene and indeno[1,2,3-c,d]pyrene were above laboratory limits for MS/MSD 1521864/1521865. The field sample used to create the MS/MSD was not a sample from this project, and results were not affected.

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

Not applicable, see above.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Not applicable, see above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and/or usability was affected; see above.

- c. Surrogates Organics Only
 - i. Are surrogate recoveries reported for organic analyses field, QC and laboratory samples?
 - Yes No Comments:
 - ii. Accuracy All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)
 - Yes No Comments:
 - iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

© Yes ⊙ No Comments:

N/A; surrogate recoveries were within acceptable criteria.

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

- d. Trip blank Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): <u>Water and</u> <u>Soil</u>
 - i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples?

(If not, enter explanation below.)

- Yes No Comments:
- ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes	🔿 No	Comments:
	agulta logg than LOO2	

iii. All results less than LOQ?

Yes O No

Comments:

iv. If above LOQ, what samples are affected?

Comments:

N/A; there were no detections in the trip blank.

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

○ Yes ● No Comments:

A field duplicate was not submitted for the naphthalene analysis by method EPA 8260.

- ii. Submitted blind to lab?
- Yes O No Comments:

The sample TWP19-101 is a field-duplicate of sample TWP19-01.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

RPD (%) = Absolute value of: $(R_1-R_2)/((R_1+R_2)/2)$ x 100

Where R_1 = Sample Concentration R_2 = Field Duplicate Concentration

○ Yes ⊙ No Comments:

The relative precision demonstrated between the detected results of the field-duplicate samples was within the recommended DQO of 30% except for DRO. The DRO results for sample *TWP19-101* and *TWP19-01* are considered estimated and have been flagged J* in the analytical results table.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

The DRO results for sample *TWP19-101* and *TWP19-01* are considered estimated and have been flagged J* in the analytical results table.

f. Decontamination or Equipment Blank (If not applicable, a comment stating why must be entered below).

○ Yes ○ No ⓒ Not Applicable

N/A; samples were not collected with reusable equipment.

- i. All results less than LOQ?
- Yes ⊙ No Comments:

N/A; samples were not collected with reusable equipment.

ii. If above LOQ, what samples are affected?

Comments:

N/A; samples were not collected with reusable equipment.

iii. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

○ Yes ● No Comments:

Additional data flags or qualifiers are not required.



Laboratory Report of Analysis

To: Shannon & Wilson-Fairbanks 2355 Hill Road Fairbanks, AK 99709 (907)749-0600

Report Number: **1199567**

Client Project: 101752 Petro Star NPR

Dear Andrew Frick,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of ten years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of fourteen (14) days from the date of this report unless other archiving requirements were included in the quote.

If there are any questions about the report or services performed during this project, please call Jennifer at (907) 562-2343. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely, SGS North America Inc.	Alaska Division Technical Director	Stephen C. Ede 2019.08.08 13:56:23 -08'00'
Jennifer Dawkins Project Manager Jennifer.Dawkins@sgs.com	Date	

Print Date: 08/08/2019 1:37:12PM

SGS North America Inc.

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Case Narrative

SGS Client: Shannon & Wilson-Fairbanks

SGS Project: 1199567

Project Name/Site: 101752 Petro Star NPR

Refer to sample receipt form for information on sample condition.

SB-19-01-7.51199567002 PSAK101 - Surrogate recovery for 4-bromofluorobenzene does not meet QC criteria due to matrix interference.

SB-19-03-6.5 1199567004 PS AK101 - Surrogate recovery for 4-bromofluorobenzene does not meet QC criteria due to matrix interference.

SB-19-103-6.5 1199567005 PS

AK101 - Surrogate recovery for 4-bromofluorobenzene does not meet QC criteria due to matrix interference.

SB-19-03-7.51199567006 PSAK101 - Surrogate recovery for 4-bromofluorobenzene does not meet QC criteria due to matrix interference.

XXX/41904]

1522739 MB

AK102/103 - DRO/RRO is detect in the MB greater than one half the LOQ, but less than the LOQ.

* QC comments may be associated with the field samples found in this report. When applicable, comments will be applied to the associated field samples.



Laboratory Qualifiers

Enclosed are the analytical results associated with the above work order. The results apply to the samples as received. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. This document is issued by the Company under its General Conditions of Service accessible at <<u>http://www.sgs.com/en/Terms-and-Conditions.aspx></u>. Attention is drawn to the limitation of liability, indenmification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the context or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & 17-021 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8015C, 8021B, 8082A, 8260C, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). SGS is only certified for the analytes listed on our Drinking Water Certification, and only those analytes will be reported to the State of Alaska for compliance. Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
В	Indicates the analyte is found in a blank associated with the sample.
CCV/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing Continuing Calibration Verification
CL	Control Limit
DF	Analytical Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LLQC/LLIQC	Low Level Quantitation Check
LOD	Limit of Detection (i.e., 1/2 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.
Sample summaries which in All DRO/RRO analyses are	nclude a result for "Total Solids" have already been adjusted for moisture content. i integrated per SOP.

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Note:

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Sample Summary

Client Sample ID	Lab Sample ID	Collected	Received	Matrix
SB-19-01-5	1199567001	07/25/2019	07/27/2019	Soil/Solid (dry weight)
SB-19-01-7.5	1199567002	07/25/2019	07/27/2019	Soil/Solid (dry weight)
SB-19-02-4.5	1199567003	07/25/2019	07/27/2019	Soil/Solid (dry weight)
SB-19-03-6.5	1199567004	07/26/2019	07/27/2019	Solid/Soil (Wet Weight)
SB-19-103-6.5	1199567005	07/26/2019	07/27/2019	Solid/Soil (Wet Weight)
SB-19-03-7.5	1199567006	07/26/2019	07/27/2019	Solid/Soil (Wet Weight)
SB-19-04-4	1199567007	07/26/2019	07/27/2019	Solid/Soil (Wet Weight)
Trip Blank	1199567008	07/25/2019	07/27/2019	Soil/Solid (dry weight)

<u>Method</u>

8270D SIM (PAH) SW8260C AK102 AK101 SM21 2540G SW8260C Method Description

8270 PAH SIM Semi-Volatiles GC/MS BTEX 8260 w/Naphthalene (S) Diesel Range Organics (S) Gasoline Range Organics (S) Percent Solids SM2540G Volatile Organic Compounds (S) FIELD EXT

Print Date: 08/08/2019 1:37:16PM



Detectable Results Summary Client Sample ID: SB-19-01-5 Lab Sample ID: 1199567001 Parameter Result Units **Diesel Range Organics** 19.1J mg/Kg Semivolatile Organic Fuels Toluene 0.00824J mg/Kg Volatile GC/MS Client Sample ID: SB-19-01-7.5 Lab Sample ID: 1199567002 Parameter Units Result 1-Methylnaphthalene 4.49 mg/Kg **Polynuclear Aromatics GC/MS** 2-Methylnaphthalene 5.25 mg/Kg Fluorene 0.452 mg/Kg Naphthalene 1.17 mg/Kg Phenanthrene 0.422 mg/Kg 0.00801J Pyrene mg/Kg Semivolatile Organic Fuels **Diesel Range Organics** 1830 mg/Kg Gasoline Range Organics 36.8 **Volatile Fuels** mg/Kg Volatile GC/MS Ethylbenzene 0.0443 mg/Kg 0.0845 o-Xylene mg/Kg P & M -Xylene 0.210 mg/Kg Toluene 0.0169J mg/Kg Xylenes (total) 0.295 mg/Kg Client Sample ID: SB-19-02-4.5 Lab Sample ID: 1199567003 Parameter Result <u>Units</u> Gasoline Range Organics Volatile Fuels 2.11J mg/Kg Client Sample ID: SB-19-03-6.5 Lab Sample ID: 1199567004 Parameter Result Units Gasoline Range Organics 413 mg/Kg **Volatile Fuels** Volatile GC/MS Benzene 0.411 mg/Kg Ethylbenzene 19.5 mg/Kg o-Xylene 27.3 mg/Kg P & M -Xylene 64.0 mg/Kg 76.2 mg/Kg Toluene Xylenes (total) 91.4 mg/Kg Client Sample ID: SB-19-103-6.5 Lab Sample ID: 1199567005 Parameter Result Units **Gasoline Range Organics** Volatile Fuels 468 mg/Kg Volatile GC/MS Benzene 0.481J mg/Kg 25.7 mg/Kg Ethylbenzene o-Xylene 34.8 mg/Kg P & M -Xylene 83.5 mg/Kg Toluene 102 mg/Kg Xylenes (total) 118 mg/Kg

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Detectable Results Summary

Client Sample ID: SB-19-03-7.5 Lab Sample ID: 1199567006 Volatile Fuels Volatile GC/MS

Parameter	Result	<u>Units</u>
Gasoline Range Organics	491	mg/Kg
Benzene	0.781	mg/Kg
Ethylbenzene	28.0	mg/Kg
o-Xylene	30.8	mg/Kg
P & M -Xylene	68.7	mg/Kg
Toluene	116	mg/Kg
Xylenes (total)	99.5	mg/Kg

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Results of SB-19-01-5							
Client Sample ID: SB-19-01-5 Client Project ID: 101752 Petro Star N Lab Sample ID: 1199567001 Lab Project ID: 1199567	Collection Date: 07/25/19 11:50 Received Date: 07/27/19 10:21 Matrix: Soil/Solid (dry weight) Solids (%):82.0 Location:						
Results by Semivolatile Organic Fuels	3		_				
Parameter	Result Qual	LOQ/CL	DL	Units	DF	<u>Allowable</u> Limits	Date Analyze
Diesel Range Organics	19.1 J	24.2	7.51	mg/Kg	1		08/02/19 16:
urrogates							
5a Androstane (surr)	76.7	50-150		%	1		08/02/19 16:
Batch Information							
Analytical Batch: XFC15206 Analytical Method: AK102 Analyst: VDL Analytical Date/Time: 08/02/19 16:10		Prep Batch: Prep Methoo Prep Date/T Prep Initial V	XXX41904 d: SW3550C ime: 08/01/1 Vt./Vol.: 30.2	9 12:14 03 g			

-

- Results of SB-19-01-5							
Client Sample ID: SB-19-01-5 Client Project ID: 101752 Petro Star NPR Lab Sample ID: 1199567001 Lab Project ID: 1199567		C F M S L	collection Da deceived Da latrix: Soil/S olids (%):82 ocation:	ate: 07/25/ [,] ite: 07/27/1 Solid (dry wo 2.0	19 11:50 9 10:21 eight)		
Results by Volatile Fuels						Allowable	
Parameter	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	DF	Limits	Date Analyzed
	1.24 U	2.47	0.742	mg/Kg	I		07729/19 10.10
Surrogates 4-Bromofluorobenzene (surr)	105	50-150		%	1		07/29/19 16:10
Batch Information							
Analytical Batch: VFC14857 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 07/29/19 16:10 Container ID: 1199567001-B			Prep Batch: Prep Method Prep Date/Ti Prep Initial W Prep Extract	VXX34546 : SW5035A me: 07/25/1 /t./Vol.: 111. Vol: 45.075	9 11:50 .237 g 1 mL		

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Results of SB-19-01-5

Client Sample ID: SB-19-01-5
Client Project ID: 101752 Petro Star NPR
Lab Sample ID: 1199567001
Lab Project ID: 1199567

Collection Date: 07/25/19 11:50 Received Date: 07/27/19 10:21 Matrix: Soil/Solid (dry weight) Solids (%):82.0 Location:

Results by Volatile GC/MS

						Allowable	
Parameter	<u>Result Qual</u>	LOQ/CL	<u>DL</u>	<u>Units</u>	DF	<u>Limits</u>	Date Analyzed
Benzene	0.00620 U	0.0124	0.00386	mg/Kg	1		08/02/19 05:02
Ethylbenzene	0.0124 U	0.0247	0.00771	mg/Kg	1		08/02/19 05:02
o-Xylene	0.0124 U	0.0247	0.00771	mg/Kg	1		08/02/19 05:02
P & M -Xylene	0.0247 U	0.0494	0.0148	mg/Kg	1		08/02/19 05:02
Toluene	0.00824 J	0.0247	0.00771	mg/Kg	1		08/02/19 05:02
Xylenes (total)	0.0371 U	0.0742	0.0225	mg/Kg	1		08/02/19 05:02
Surrogates							
1,2-Dichloroethane-D4 (surr)	94.7	71-136		%	1		08/02/19 05:02
4-Bromofluorobenzene (surr)	136	55-151		%	1		08/02/19 05:02
Toluene-d8 (surr)	98.8	85-116		%	1		08/02/19 05:02

Batch Information

Analytical Batch: VMS19265 Analytical Method: SW8260C Analyst: NRO Analytical Date/Time: 08/02/19 05:02 Container ID: 1199567001-B Prep Batch: VXX34581 Prep Method: SW5035A Prep Date/Time: 07/25/19 11:50 Prep Initial Wt./Vol.: 111.237 g Prep Extract Vol: 45.0751 mL

Print Date: 08/08/2019 1:37:18PM

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Results of SB-19-01-7.5

Client Sample ID: **SB-19-01-7.5** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199567002 Lab Project ID: 1199567 Collection Date: 07/25/19 13:06 Received Date: 07/27/19 10:21 Matrix: Soil/Solid (dry weight) Solids (%):88.0 Location:

Results by Polynuclear Aromatics GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	DF	<u>Limits</u>	Date Analyzed
1-Methylnaphthalene	4.49	0.560	0.140	mg/Kg	20		08/04/19 22:55
2-Methylnaphthalene	5.25	0.560	0.140	mg/Kg	20		08/04/19 22:55
Acenaphthene	0.0140 U	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Acenaphthylene	0.0140 U	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Anthracene	0.0140 U	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Benzo(a)Anthracene	0.0140 U	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Benzo[a]pyrene	0.0140 U	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Benzo[b]Fluoranthene	0.0140 U	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Benzo[g,h,i]perylene	0.0140 U	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Benzo[k]fluoranthene	0.0140 U	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Chrysene	0.0140 U	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Dibenzo[a,h]anthracene	0.0140 U	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Fluoranthene	0.0140 U	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Fluorene	0.452	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Indeno[1,2,3-c,d] pyrene	0.0140 U	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Naphthalene	1.17	0.448	0.112	mg/Kg	20		08/04/19 22:55
Phenanthrene	0.422	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Pyrene	0.00801 J	0.0280	0.00700	mg/Kg	1		08/03/19 21:08
Surrogates							
2-Methylnaphthalene-d10 (surr)	73.8	58-103		%	1		08/03/19 21:08
Fluoranthene-d10 (surr)	77.6	54-113		%	1		08/03/19 21:08

Batch Information

Analytical Batch: XMS11595 Analytical Method: 8270D SIM (PAH) Analyst: DSD Analytical Date/Time: 08/03/19 21:08 Container ID: 1199567002-A

Analytical Batch: XMS11596 Analytical Method: 8270D SIM (PAH) Analyst: DSD Analytical Date/Time: 08/04/19 22:55 Container ID: 1199567002-A Prep Batch: XXX41900 Prep Method: SW3550C Prep Date/Time: 08/01/19 08:02 Prep Initial Wt./Vol.: 22.828 g Prep Extract Vol: 5 mL

Prep Batch: XXX41900 Prep Method: SW3550C Prep Date/Time: 08/01/19 08:02 Prep Initial Wt./Vol.: 22.828 g Prep Extract Vol: 5 mL

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Results of SB-19-01-7.5							
Client Sample ID: SB-19-01-7.5 Client Project ID: 101752 Petro Star N Lab Sample ID: 1199567002 Lab Project ID: 1199567	R N S L	atrix: Soil/S olids (%):88 ocation:	te: 07/25/ olid (dry we	9 10:21 9 10:21			
Results by Semivolatile Organic Fuels	j		_			Allowable	
Parameter	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	DF	Limits	Date Analyzed
Diesel Range Organics	1830	22.6	7.02	mg/Kg	1		08/02/19 16:21
Surrogates							
5a Androstane (surr)	81.6	50-150		%	1		08/02/19 16:21
Batch Information Analytical Batch: XFC15206 Analytical Method: AK102 Analyst: VDL Analytical Date/Time: 08/02/19 16:21 Container ID: 1199567002-A			Prep Batch: 2 Prep Method: Prep Date/Tir Prep Initial W Prep Extract 1	XXX41904 : SW3550C ne: 08/01/1 t./Vol.: 30.1 Vol: 5 mL	9 12:14 24 g		

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Results of SB-19-01-7.5								
Client Sample ID: SB-19-01-7.5 Client Project ID: 101752 Petro Star NPR Lab Sample ID: 1199567002 Lab Project ID: 1199567			C R M S L	Collection Date: 07/25/19 13:06 Received Date: 07/27/19 10:21 Matrix: Soil/Solid (dry weight) Solids (%):88.0 Location:				
Results by Volatile Fuels							Allowable	
Parameter	<u>Result</u> C	<u>Qual</u>	LOQ/CL	DL	<u>Units</u>	<u>DF</u>	Limits	Date Analyze
Gasoline Range Organics	36.8		4.36	1.31	mg/Kg	1		07/29/19 16:2
Surrogates								
4-Bromofluorobenzene (surr)	293	*	50-150		%	1		07/29/19 16:2
Batch Information								
Analytical Batch: VFC14857				Prep Batch:	VXX34546			
Analytical Method: AK101 Analyst: NRB				Prep Metho Prep Date/T	d: SW5035A ime: 07/25/1	9 13.06		
Analytical Date/Time: 07/29/19 16:27				Prep Initial \	Nt./Vol.: 38.7	'03 g		
Container ID: 1199567002-B				Prep Extrac	t Vol: 29.660	9 mL		

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Results of SB-19-01-7.5

Client Sample ID: **SB-19-01-7.5** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199567002 Lab Project ID: 1199567 Collection Date: 07/25/19 13:06 Received Date: 07/27/19 10:21 Matrix: Soil/Solid (dry weight) Solids (%):88.0 Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	Limits	Date Analyzed
Benzene	0.0109 U	0.0218	0.00680	mg/Kg	1		08/02/19 05:18
Ethylbenzene	0.0443	0.0436	0.0136	mg/Kg	1		08/02/19 05:18
o-Xylene	0.0845	0.0436	0.0136	mg/Kg	1		08/02/19 05:18
P & M -Xylene	0.210	0.0871	0.0261	mg/Kg	1		08/02/19 05:18
Toluene	0.0169 J	0.0436	0.0136	mg/Kg	1		08/02/19 05:18
Xylenes (total)	0.295	0.131	0.0397	mg/Kg	1		08/02/19 05:18
Surrogates							
1,2-Dichloroethane-D4 (surr)	99.2	71-136		%	1		08/02/19 05:18
4-Bromofluorobenzene (surr)	120	55-151		%	1		08/02/19 05:18
Toluene-d8 (surr)	98.9	85-116		%	1		08/02/19 05:18

Batch Information

Analytical Batch: VMS19265 Analytical Method: SW8260C Analyst: NRO Analytical Date/Time: 08/02/19 05:18 Container ID: 1199567002-B Prep Batch: VXX34581 Prep Method: SW5035A Prep Date/Time: 07/25/19 13:06 Prep Initial Wt./Vol.: 38.703 g Prep Extract Vol: 29.6609 mL

Print Date: 08/08/2019 1:37:18PM

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Results of SB-19-02-4.5							
Client Sample ID: SB-19-02-4.5 Client Project ID: 101752 Petro Star N Lab Sample ID: 1199567003 Lab Project ID: 1199567	C F N S L	Collection D Received Da Matrix: Soil/ Colids (%):7 ocation:					
Results by Semivolatile Organic Fuels	5					Allowable	
Parameter	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	<u>DF</u>	Limits	Date Analyzed
Diesel Range Organics	12.7 U	25.4	7.88	mg/Kg	1		08/05/19 13:13
Surrogates							
5a Androstane (surr)	77.4	50-150		%	1		08/05/19 13:13
Batch Information							
Analytical Batch: XFC15211 Analytical Method: AK102 Analyst: VDL Analytical Date/Time: 08/05/19 13:13			Prep Batch: Prep Method Prep Date/T Prep Initial V	XXX41915 d: SW3550C ime: 08/02/1 Wt./Vol.: 30.3	9 13:01 351 g		

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-Results of SB-19-02-4.5								
Client Sample ID: SB-19-02-4.5 Client Project ID: 101752 Petro Star N Lab Sample ID: 1199567003 Lab Project ID: 1199567	PR	C F M S L	Collection Date: 07/25/19 15:05 Received Date: 07/27/19 10:21 Matrix: Soil/Solid (dry weight) Solids (%):77.8 Location:					
Results by Volatile Fuels								
Parameter Gasoline Range Organics	<u>Result Qual</u> 2.11 J	<u>LOQ/CL</u> 5.29	<u>DL</u> 1.59	<u>Units</u> mg/Kg	<u>DF</u> 1	<u>Allowable</u> Limits	Date Analyzed	
Surrogates								
4-Bromofluorobenzene (surr)	92.5	50-150		%	1		07/29/19 16:45	
Batch Information								
Analytical Batch: VFC14857 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 07/29/19 16:45 Container ID: 1199567003-B			Prep Batch: Prep Methoo Prep Date/T Prep Initial V Prep Extraci	VXX34546 d: SW5035A ime: 07/25/1 Vt./Vol.: 41.6 t Vol: 34.252	9 15:05 41 g 8 mL			

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Results of SB-19-02-4.5

Client Sample ID: **SB-19-02-4.5** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199567003 Lab Project ID: 1199567

Collection Date: 07/25/19 15:05 Received Date: 07/27/19 10:21 Matrix: Soil/Solid (dry weight) Solids (%):77.8 Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	DF	Limits	Date Analyzed
Benzene	0.0132 U	0.0264	0.00825	mg/Kg	1		08/03/19 01:16
Ethylbenzene	0.0265 U	0.0529	0.0165	mg/Kg	1		08/03/19 01:16
o-Xylene	0.0265 U	0.0529	0.0165	mg/Kg	1		08/03/19 01:16
P & M -Xylene	0.0530 U	0.106	0.0317	mg/Kg	1		08/03/19 01:16
Toluene	0.0265 U	0.0529	0.0165	mg/Kg	1		08/03/19 01:16
Xylenes (total)	0.0795 U	0.159	0.0482	mg/Kg	1		08/03/19 01:16
Surrogates							
1,2-Dichloroethane-D4 (surr)	93	71-136		%	1		08/03/19 01:16
4-Bromofluorobenzene (surr)	117	55-151		%	1		08/03/19 01:16
Toluene-d8 (surr)	103	85-116		%	1		08/03/19 01:16

Batch Information

Analytical Batch: VMS19261 Analytical Method: SW8260C Analyst: NRO Analytical Date/Time: 08/03/19 01:16 Container ID: 1199567003-B Prep Batch: VXX34577 Prep Method: SW5035A Prep Date/Time: 07/25/19 15:05 Prep Initial Wt./Vol.: 41.641 g Prep Extract Vol: 34.2528 mL

Print Date: 08/08/2019 1:37:18PM

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-Results of SB-19-03-6.5								
Client Sample ID: SB-19-03-6.5 Client Project ID: 101752 Petro Star N Lab Sample ID: 1199567004 Lab Project ID: 1199567		C R M S L	Collection D Received Da Matrix: Solid Colids (%): ocation:					
Results by Volatile Fuels				_				
<u>Parameter</u> Gasoline Range Organics	<u>Result Q</u> 413	ual	<u>LOQ/CL</u> 25.6	<u>DL</u> 7.69	<u>Units</u> mg/Kg	<u>DF</u> 20	<u>Allowable</u> Limits	<u>Date Analyze</u> 07/31/19 04:4
Surrogates								
4-Bromofluorobenzene (surr)	679	*	50-150		%	20		07/31/19 04:4
Batch Information								
Analytical Batch: VFC14859 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 07/31/19 04:48 Container ID: 1199567004-A				Prep Batch: Prep Method Prep Date/T Prep Initial V Prep Extract	VXX34554 d: SW5035A ime: 07/26/1 Vt./Vol.: 97.5 : Vol: 25 mL	9 09:50 ;34 g		

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Results of SB-19-03-6.5

Client Sample ID: **SB-19-03-6.5** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199567004 Lab Project ID: 1199567 Collection Date: 07/26/19 09:50 Received Date: 07/27/19 10:21 Matrix: Solid/Soil (Wet Weight) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	<u>DF</u>	Limits	Date Analyzed
Benzene	0.411	0.320	0.100	mg/Kg	50		08/02/19 03:35
Ethylbenzene	19.5	0.641	0.200	mg/Kg	50		08/02/19 03:35
Naphthalene	0.321 U	0.641	0.200	mg/Kg	50		08/02/19 03:35
o-Xylene	27.3	0.641	0.200	mg/Kg	50		08/02/19 03:35
P & M -Xylene	64.0	1.28	0.384	mg/Kg	50		08/02/19 03:35
Toluene	76.2	2.56	0.800	mg/Kg	200		08/05/19 10:33
Xylenes (total)	91.4	1.92	0.584	mg/Kg	50		08/02/19 03:35
Surrogates							
1,2-Dichloroethane-D4 (surr)	80.1	71-136		%	50		08/02/19 03:35
4-Bromofluorobenzene (surr)	90.8	55-151		%	50		08/02/19 03:35
Toluene-d8 (surr)	105	85-116		%	50		08/02/19 03:35

Batch Information

Analytical Batch: VMS19257 Analytical Method: SW8260C Analyst: NRO Analytical Date/Time: 08/02/19 03:35 Container ID: 1199567004-A

Analytical Batch: VMS19273 Analytical Method: SW8260C Analyst: NRO Analytical Date/Time: 08/05/19 10:33 Container ID: 1199567004-A Prep Batch: VXX34574 Prep Method: SW5035A Prep Date/Time: 07/26/19 09:50 Prep Initial Wt./Vol.: 97.534 g Prep Extract Vol: 25 mL

Prep Batch: VXX34598 Prep Method: SW5035A Prep Date/Time: 07/26/19 09:50 Prep Initial Wt./Vol.: 97.534 g Prep Extract Vol: 25 mL

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Results of SB-19-103-6.5								
Client Sample ID: SB-19-103-6.5 Client Project ID: 101752 Petro Star N Lab Sample ID: 1199567005 Lab Project ID: 1199567		C F M S L	collection D teceived Da fatrix: Solic colids (%): ocation:	ate: 07/26/ ate: 07/27/1 I/Soil (Wet V				
Results by Volatile Fuels				_				
Parameter Gasoline Range Organics	<u>Result Q</u> 468	<u>)ual</u>	<u>LOQ/CL</u> 76.1	<u>DL</u> 22.8	<u>Units</u> mg/Kg	<u>DF</u> 50	<u>Allowable</u> <u>Limits</u>	<u>Date Analyze</u> 07/31/19 05:0
Surrogates 4-Bromofluorobenzene (surr)	792	*	50-150		%	50		07/31/19 05:0
Batch Information								
Analytical Batch: VFC14859 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 07/31/19 05:06				Prep Batch: Prep Metho Prep Date/T Prep Initial \ Prep Extrac	VXX34554 d: SW5035A ïme: 07/26/1 Wt./Vol.: 82.1 t Vol: 25 mL	9 09:40 51 g		

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Results of SB-19-103-6.5

Client Sample ID: **SB-19-103-6.5** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199567005 Lab Project ID: 1199567 Collection Date: 07/26/19 09:40 Received Date: 07/27/19 10:21 Matrix: Solid/Soil (Wet Weight) Solids (%): Location:

Results by Volatile GC/MS

					Allowable	
Result Qual	LOQ/CL	DL	<u>Units</u>	DF	Limits	Date Analyzed
0.481 J	1.52	0.475	mg/Kg	200		08/05/19 10:17
25.7	0.761	0.237	mg/Kg	50		08/02/19 03:52
0.381 U	0.761	0.237	mg/Kg	50		08/02/19 03:52
34.8	0.761	0.237	mg/Kg	50		08/02/19 03:52
83.5	1.52	0.456	mg/Kg	50		08/02/19 03:52
102	3.04	0.949	mg/Kg	200		08/05/19 10:17
118	2.28	0.694	mg/Kg	50		08/02/19 03:52
89.9	71-136		%	200		08/05/19 10:17
87.2	55-151		%	50		08/02/19 03:52
105	85-116		%	50		08/02/19 03:52
	Result Qual 0.481 J 25.7 0.381 U 34.8 83.5 102 118 89.9 87.2 105	Result QualLOQ/CL0.481 J1.5225.70.7610.381 U0.76134.80.76183.51.521023.041182.2889.971-13687.255-15110585-116	Result Qual LOQ/CL DL 0.481 J 1.52 0.475 25.7 0.761 0.237 0.381 U 0.761 0.237 34.8 0.761 0.237 83.5 1.52 0.456 102 3.04 0.949 118 2.28 0.694 89.9 71-136 87.2 55-151 105 85-116	Result Qual LOQ/CL DL Units 0.481 J 1.52 0.475 mg/Kg 25.7 0.761 0.237 mg/Kg 0.381 U 0.761 0.237 mg/Kg 34.8 0.761 0.237 mg/Kg 83.5 1.52 0.456 mg/Kg 102 3.04 0.949 mg/Kg 118 2.28 0.694 mg/Kg 89.9 71-136 % % 87.2 55-151 % % 105 85-116 % %	Result Qual LOQ/CL DL Units DF 0.481 J 1.52 0.475 mg/Kg 200 25.7 0.761 0.237 mg/Kg 50 0.381 U 0.761 0.237 mg/Kg 50 34.8 0.761 0.237 mg/Kg 50 83.5 1.52 0.456 mg/Kg 50 102 3.04 0.949 mg/Kg 50 118 2.28 0.694 mg/Kg 50 89.9 71-136 % 200 87.2 55-151 % 50 105 85-116 % 50	Result Qual LOQ/CL DL Units DF Limits 0.481 J 1.52 0.475 mg/Kg 200 25.7 0.761 0.237 mg/Kg 50 0.381 U 0.761 0.237 mg/Kg 50 34.8 0.761 0.237 mg/Kg 50 83.5 1.52 0.456 mg/Kg 50 102 3.04 0.949 mg/Kg 50 118 2.28 0.694 mg/Kg 50 89.9 71-136 % 200 87.2 55-151 % 50 105 85-116 % 50

Batch Information

Analytical Batch: VMS19257 Analytical Method: SW8260C Analyst: NRO Analytical Date/Time: 08/02/19 03:52 Container ID: 1199567005-A

Analytical Batch: VMS19273 Analytical Method: SW8260C Analyst: NRO Analytical Date/Time: 08/05/19 10:17 Container ID: 1199567005-A Prep Batch: VXX34574 Prep Method: SW5035A Prep Date/Time: 07/26/19 09:40 Prep Initial Wt./Vol.: 82.151 g Prep Extract Vol: 25 mL

Prep Batch: VXX34598 Prep Method: SW5035A Prep Date/Time: 07/26/19 09:40 Prep Initial Wt./Vol.: 82.151 g Prep Extract Vol: 25 mL

Print Date: 08/08/2019 1:37:18PM

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- Results of SB-19-03-7.5								
Client Sample ID: SB-19-03-7.5 Client Project ID: 101752 Petro Star N Lab Sample ID: 1199567006 Lab Project ID: 1199567		C R M S La	Collection Date: 07/26/19 09:57 Received Date: 07/27/19 10:21 Matrix: Solid/Soil (Wet Weight) Solids (%): Location:					
- Results by Volatile Fuels				_				
Parameter Gasoline Range Organics	<u>Result C</u> 491	<u>tual</u>	<u>LOQ/CL</u> 34.0	<u>DL</u> 10.2	<u>Units</u> mg/Kg	<u>DF</u> 50	<u>Allowable</u> <u>Limits</u>	<u>Date Analyzed</u> 07/31/19 05:2
Surrogates 4-Bromofluorobenzene (surr)	1810	*	50-150		%	50		07/31/19 05:2
Batch Information								
Analytical Batch: VFC14859 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 07/31/19 05:23 Container ID: 1199567006-A			F F F	Prep Batch: Prep Metho Prep Date/T Prep Initial \ Prep Extrac	VXX34554 d: SW5035A ime: 07/26/1 Vt./Vol.: 183. t Vol: 25 mL	9 09:57 97 g		

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Results of SB-19-03-7.5

Client Sample ID: **SB-19-03-7.5** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199567006 Lab Project ID: 1199567 Collection Date: 07/26/19 09:57 Received Date: 07/27/19 10:21 Matrix: Solid/Soil (Wet Weight) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	Limits	Date Analyzed
Benzene	0.781	0.170	0.0530	mg/Kg	50		08/02/19 04:08
Ethylbenzene	28.0	0.340	0.106	mg/Kg	50		08/02/19 04:08
Naphthalene	0.170 U	0.340	0.106	mg/Kg	50		08/02/19 04:08
o-Xylene	30.8	3.40	1.06	mg/Kg	500		08/05/19 10:02
P & M -Xylene	68.7	6.79	2.04	mg/Kg	500		08/05/19 10:02
Toluene	116	3.40	1.06	mg/Kg	500		08/05/19 10:02
Xylenes (total)	99.5	10.2	3.10	mg/Kg	500		08/05/19 10:02
Surrogates							
1,2-Dichloroethane-D4 (surr)	79.7	71-136		%	50		08/02/19 04:08
4-Bromofluorobenzene (surr)	68.8	55-151		%	50		08/02/19 04:08
Toluene-d8 (surr)	107	85-116		%	50		08/02/19 04:08

Batch Information

Analytical Batch: VMS19257 Analytical Method: SW8260C Analyst: NRO Analytical Date/Time: 08/02/19 04:08 Container ID: 1199567006-A

Analytical Batch: VMS19273 Analytical Method: SW8260C Analyst: NRO Analytical Date/Time: 08/05/19 10:02 Container ID: 1199567006-A Prep Batch: VXX34574 Prep Method: SW5035A Prep Date/Time: 07/26/19 09:57 Prep Initial Wt./Vol.: 183.97 g Prep Extract Vol: 25 mL

Prep Batch: VXX34598 Prep Method: SW5035A Prep Date/Time: 07/26/19 09:57 Prep Initial Wt./Vol.: 183.97 g Prep Extract Vol: 25 mL

Print Date: 08/08/2019 1:37:18PM

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Client Sample ID: SB-19-04-4 Client Project ID: 101752 Petro Star NPR Lab Sample ID: 1199567007 Lab Project ID: 1199567 Results by Volatile Fuels Parameter Gasoline Range Organics 4-Bromofluorobenzene (surr) Batch Information Collection Date: 07/26/19 10:50 Received Date: 07/27/19 10:21 Matrix: Solid/Soil (Wet Weight) Solids (%): Location: Result Qual LOQ/CL DL Units Matrix: DF Limits Allowable Limits % 1			19 10:50 9 10:21 Veight)	te: 07/26/1 te: 07/27/1 Soil (Wet W	ollection Da	C		ent Sample ID: SB-19-04-4
Results by Volatile Fuels Parameter Result Qual LOQ/CL DL Units DF Limits Gasoline Range Organics 0.745 U 1.49 0.448 mg/Kg 1 urrogates 4-Bromofluorobenzene (surr) 57.4 50-150 % 1 Batch Information Ling Ling <thling< th=""> Ling Ling</thling<>					latrix: Solid/ olids (%): ocation:	M S L	NPR	ent Project ID: 101752 Petro Star I b Sample ID: 1199567007 b Project ID: 1199567
Parameter Result Qual LOQ/CL DL Units DF Limits Gasoline Range Organics 0.745 U 1.49 0.448 mg/Kg 1 urrogates 4-Bromofluorobenzene (surr) 57.4 50-150 % 1 Batch Information Limits DE Limits DE Limits	-							esults by Volatile Fuels
urrogates 4-Bromofluorobenzene (surr) 57.4 50-150 % 1 Batch Information	<u>e</u> <u>Date Analyze</u> 07/29/19 17:2	Allowable Limits	<u>DF</u> 1	<u>Units</u> mg/Kg	<u>DL</u> 0.448	<u>LOQ/CL</u> 1.49	<u>Result Qual</u> 0.745 U	<u>rameter</u> Isoline Range Organics
4-Bromofluorobenzene (surr) 57.4 50-150 % 1 Batch Information								rogates
Batch Information	07/29/19 17:2		1	%		50-150	57.4	Bromofluorobenzene (surr)
Analytical Batch: VFC14857Prep Batch: VXX34546Analytical Method: AK101Prep Method: SW5035AAnalyst: NRBPrep Date/Time: 07/26/19 10:50Analytical Date/Time: 07/29/19 17:20Prep Initial Wt./Vol.: 83.764 gContainer ID: 1199567007-APrep Extract Vol: 25 mL			9 10:50 '64 g	VXX34546 : SW5035A ne: 07/26/19 /t./Vol.: 83.7 Vol: 25 mL	Prep Batch: Prep Method: Prep Date/Tir Prep Initial W Prep Extract			Analytical Batch: VFC14857 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 07/29/19 17:20 Container ID: 1199567007-A

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Results of SB-19-04-4

Client Sample ID: SB-19-04-4 Client Project ID: 101752 Petro Sta Lab Sample ID: 1199567007 Lab Project ID: 1199567	ar NPR	Collection Date: 07/26/19 Received Date: 07/27/19 Matrix: Solid/Soil (Wet Wei Solids (%): Location:			
Results by Volatile GC/MS					
Parameter	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	DF
Benzene	0.00373 U	0.00746	0.00233	mg/Kg	1
Ethylbenzene	0.00745 U	0.0149	0.00466	mg/Kg	1
Naphthalene	0.00745 U	0.0149	0.00466	mg/Kg	1
o-Xylene	0.00745 U	0.0149	0.00466	mg/Kg	1
P & M -Xylene	0.0149 U	0.0298	0.00895	mg/Kg	1
Toluene	0.00745 U	0.0149	0.00466	mg/Kg	1

0.0224 U

0.0448

0.0136

Surrogates

Xylenes (total)

1,2-Dichloroethane-D4 (surr)	93.5	71-136	
4-Bromofluorobenzene (surr)	76.8	55-151	
Toluene-d8 (surr)	104	85-116	

Batch Information

Analytical Batch: VMS19257 Analytical Method: SW8260C Analyst: NRO Analytical Date/Time: 08/02/19 00:54 Container ID: 1199567007-A

Prep Batch: VXX34574 Prep Method: SW5035A Prep Date/Time: 07/26/19 10:50 Prep Initial Wt./Vol.: 83.764 g Prep Extract Vol: 25 mL

10:50

1

1

1

1

mg/Kg

%

%

%

Allowable

<u>Limits</u>

Date Analyzed

08/02/19 00:54

08/02/19 00:54

08/02/19 00:54 08/02/19 00:54

08/02/19 00:54

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Results of Trip Blank							
Client Sample ID: Trip Blank Client Project ID: 101752 Petro Star N ab Sample ID: 1199567008 ab Project ID: 1199567	mple ID: Trip Blank oject ID: 101752 Petro Star NPR ple ID: 1199567008 ect ID: 1199567				19 11:50 9 10:21 eight)		
Results by Volatile Fuels			_				
P <u>arameter</u> Gasoline Range Organics	<u>Result Qual</u> 1.26 U	<u>LOQ/CL</u> 2.53	<u>DL</u> 0.760	<u>Units</u> mg/Kg	<u>DF</u> 1	<u>Allowable</u> Limits	Date Analyzed 07/29/19 13:1
irrogates							
-Bromofluorobenzene (surr)	78.3	50-150		%	1		07/29/19 13:1
Batch Information							
Analytical Batch: VFC14857 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 07/29/19 13:13 Container ID: 1199567008-A		i i i i i i i i i i i i i i i i i i i	Prep Batch: Prep Method Prep Date/Ti Prep Initial W Prep Extract	VXX34546 : SW5035A me: 07/25/1 /t./Vol.: 49.3 Vol: 25 mL	9 11:50 53 g		

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Results of Trip Blank

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Client Sample ID: Trip Blank
Client Project ID: 101752 Petro Star NPR
Lab Sample ID: 1199567008
Lab Project ID: 1199567

Collection Date: 07/25/19 11:50 Received Date: 07/27/19 10:21 Matrix: Soil/Solid (dry weight) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	DF	Limits	Date Analyzed
Benzene	0.00635 U	0.0127	0.00395	mg/Kg	1		08/02/19 23:55
Ethylbenzene	0.0127 U	0.0253	0.00790	mg/Kg	1		08/02/19 23:55
Naphthalene	0.0127 U	0.0253	0.00790	mg/Kg	1		08/02/19 23:55
o-Xylene	0.0127 U	0.0253	0.00790	mg/Kg	1		08/02/19 23:55
P & M -Xylene	0.0254 U	0.0507	0.0152	mg/Kg	1		08/02/19 23:55
Toluene	0.0127 U	0.0253	0.00790	mg/Kg	1		08/02/19 23:55
Xylenes (total)	0.0380 U	0.0760	0.0231	mg/Kg	1		08/02/19 23:55
Surrogates							
1,2-Dichloroethane-D4 (surr)	93.8	71-136		%	1		08/02/19 23:55
4-Bromofluorobenzene (surr)	115	55-151		%	1		08/02/19 23:55
Toluene-d8 (surr)	103	85-116		%	1		08/02/19 23:55

Batch Information

Analytical Batch: VMS19261 Analytical Method: SW8260C Analyst: NRO Analytical Date/Time: 08/02/19 23:55 Container ID: 1199567008-A Prep Batch: VXX34577 Prep Method: SW5035A Prep Date/Time: 07/25/19 11:50 Prep Initial Wt./Vol.: 49.353 g Prep Extract Vol: 25 mL

Print Date: 08/08/2019 1:37:18PM

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Method Blank					
Blank ID: MB for HBN 1 Blank Lab ID: 1522683	1797255 [SPT/10841]	Matrix	:: Soil/Solid (c	dry weight)	
QC for Samples: 1199567001, 1199567002	2, 1199567003				
Results by SM21 25400	3				
Parameter	Results		וח	Unite	
Total Solids	100			%	
Batch Information					
Analytical Batch: SPT Analytical Method: SM Instrument: Analyst: MER Analytical Date/Time:	10841 121 2540G 7/31/2019 11:59:00PM				

C for Samples:	2687		Matrix: Soil/So	07/31/2019 23:59 lid (dry weight)	
esults by SM21 2540G	Original	Duplicato	Lipite		
<u>AME</u> otal Solids	<u>94</u> 6	94.3	<u>omis</u> %	0.37	(< 15)
Analytical Batch: SP11084 Analytical Method: SM21 2 Instrument: Analyst: MER	1 2540G				

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Duplicate Sample Sumr	nary						
Original Sample ID: 119 Duplicate Sample ID: 15 QC for Samples: 1199567001, 119956700	9565001 522688 02, 1199567003		Analysis Date: Matrix: Soil/So	07/31/2019 23:59 lid (dry weight)	//31/2019 23:59 (dry weight)		
Results by SM21 2540G							
NAME	Original	Duplicate	<u>Units</u>	<u>RPD (%)</u>	RPD CL		
Total Solids	98.1	98.1	%	0.01	(< 15)		
Analytical Batch: SPT108 Analytical Method: SM21 Instrument: Analyst: MER	941 1 2540G						

Print Date: 08/08/2019 1:37:20PM

Method Blank		1				
Blank ID: MB for HBN 179710 Blank Lab ID: 1522324	Matrix: Soil/Solid (dry weight)					
QC for Samples: 1199567001, 1199567002, 1199	9567003, 1199567007, 11	99567008				
Results by AK101						
Parameter Gasoline Range Organics	<u>Results</u> 1.25U	LOQ/CL 2.50	<u>DL</u> 0.750	<u>Units</u> mg/Kg		
Surrogates 4-Bromofluorobenzene (surr)	76.4	50-150		%		
Batch Information						
Analytical Batch: VFC14857 Analytical Method: AK101 Instrument: Agilent 7890 PIE Analyst: NRB Analytical Date/Time: 7/29/2	0/FID 019 12:55:00PM	Prep Ba Prep Me Prep Da Prep Ini Prep Ex	tch: VXX34546 ethod: SW5035 tte/Time: 7/29/2 tial Wt./Vol.: 50 tract Vol: 25 m	6 A 2019 6:00:00AM 9 L		

Blank Spike ID: LCS for HBN 1199567 [VXX34546] Blank Spike Lab ID: 1522325 Date Analyzed: 07/29/2019 11:09 Spike Duplicate ID: LCSD for HBN 1199567 [VXX34546] Spike Duplicate Lab ID: 1522326 Matrix: Soil/Solid (dry weight)

QC for Samples: 1199567001, 1199567002, 1199567003, 1199567007, 1199567008

	E	Blank Spike	(mg/Kg)	S	pike Duplic	ate (mg/Kg)			
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	CL	<u>RPD (%)</u>	RPD (
Gasoline Range Organics	12.5	11.7	94	12.5	12.4	99	(60-120)	6.00	(< 20)
urrogates									
4-Bromofluorobenzene (surr)	1.25	79.2	79	1.25	81.3	81	(50-150)	2.50	
Analytical Method: AK101 Instrument: Agilent 7890 PID/ Analyst: NRB	/FID			Pre Pre Spil Dup	, p Method: p Date/Tim ke Init Wt./\ pe Init Wt./\	SW5035A e: 07/29/201 /ol.: 12.5 mg /ol.: 12.5 mg	9 06:00 g/Kg Extract g/Kg Extract	Vol: 25 mL Vol: 25 mL	

Print Date: 08/08/2019 1:37:23PM

Method Blank Blank ID: MB for HBN 1797 Blank Lab ID: 1522538 QC for Samples: 1199567004, 1199567005, 119	216 [VXX/34554] 99567006	Matrix:	Soil/Solid (c	ry weight)
Results by AK101				
Parameter Gasoline Pange Organics	Results	LOQ/CL 2 50	<u>DL</u> 0.750	<u>Units</u> ma/Ka
Surrogates	1.230	2.50	0.750	ing/kg
4-Bromofluorobenzene (surr)	85.9	50-150		%
Batch Information				
Analytical Batch: VFC1485	9	Prep Bato	ch: VXX34554	Ļ
Analytical Method: AK101		Prep Metl Prep Date	hod: SW5035 /Time: 7/30/	Α 2019 είδιο αλα
		Prep Initia	al Wt./Vol.: 50	g
Analyst: NRB				

Print Date: 08/08/2019 1:37:24PM



Blank Spike ID: LCS for HBN 1199567 [VXX34554] Blank Spike Lab ID: 1522539 Date Analyzed: 07/30/2019 22:03 Spike Duplicate ID: LCSD for HBN 1199567 [VXX34554] Spike Duplicate Lab ID: 1522540 Matrix: Soil/Solid (dry weight)

QC for Samples: 1199567004, 1199567005, 1199567006

Results by AK101									
	E	Blank Spike (mg/Kg)			Spike Duplicate (mg/Kg)				
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>	<u>RPD (%)</u>	RPD CL
Gasoline Range Organics	12.5	12.0	96	12.5	11.7	94	(60-120)	2.40	(< 20)
Surrogates									
4-Bromofluorobenzene (surr)	1.25	85.8	86	1.25	82	82	(50-150)	4.60	
Batch Information									
Analytical Batch: VFC14859				Pre	p Batch: V	XX34554			
Analytical Method: AK101				Pre	p Method:	SW5035A			
Instrument: Agilent 7890 PID	/FID			Pre	p Date/Tim	e: 07/30/201	9 06:00		
Analyst: NRB				Spi	ke Init Wt./\	/ol.: 12.5 m	g/Kg Extract	t Vol: 25 mL	
				Dup	be Init Wt./V	/ol.: 12.5 mg	g/Kg Extract	Vol: 25 mL	

Print Date: 08/08/2019 1:37:26PM

Method Blank

Blank ID: MB for HBN 1797408 [VXX/34574] Blank Lab ID: 1523290 Matrix: Soil/Solid (dry weight)

QC for Samples: 1199567004, 1199567005, 1199567006, 1199567007

Results by SW8260C

Parameter	<u>Results</u>	LOQ/CL	<u>DL</u>	<u>Units</u>
Benzene	0.00625U	0.0125	0.00390	mg/Kg
Ethylbenzene	0.0125U	0.0250	0.00780	mg/Kg
Naphthalene	0.0125U	0.0250	0.00780	mg/Kg
o-Xylene	0.0125U	0.0250	0.00780	mg/Kg
P & M -Xylene	0.0250U	0.0500	0.0150	mg/Kg
Toluene	0.0125U	0.0250	0.00780	mg/Kg
Xylenes (total)	0.0375U	0.0750	0.0228	mg/Kg
Surrogates				
1,2-Dichloroethane-D4 (surr)	96.1	71-136		%
4-Bromofluorobenzene (surr)	99.8	55-151		%
Toluene-d8 (surr)	104	85-116		%

Batch Information

Analytical Batch: VMS19257 Analytical Method: SW8260C Instrument: VQA 7890/5975 GC/MS Analyst: NRO Analytical Date/Time: 8/1/2019 8:52:00PM Prep Batch: VXX34574 Prep Method: SW5035A Prep Date/Time: 8/1/2019 6:00:00AM Prep Initial Wt./Vol.: 50 g Prep Extract Vol: 25 mL

Print Date: 08/08/2019 1:37:28PM



Blank Spike ID: LCS for HBN 1199567 [VXX34574] Blank Spike Lab ID: 1523291 Date Analyzed: 08/01/2019 21:08

Matrix: Soil/Solid (dry weight)

QC for Samples:

1199567004, 1199567005, 1199567006, 1199567007

Results by SW8260C

	E	lank Spike	(mg/Kg)	
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>
Benzene	0.750	0.813	108	(77-121)
Ethylbenzene	0.750	0.781	104	(76-122)
Naphthalene	0.750	0.714	95	(62-129)
o-Xylene	0.750	0.768	102	(77-123)
P & M -Xylene	1.50	1.51	101	(77-124)
Toluene	0.750	0.795	106	(77-121)
Xylenes (total)	2.25	2.28	101	(78-124)
Surrogates				
1,2-Dichloroethane-D4 (surr)	0.750	88.3	88	(71-136)
4-Bromofluorobenzene (surr)	0.750	98.2	98	(55-151)
Toluene-d8 (surr)	0.750	105	105	(85-116)

Batch Information

Analytical Batch: VMS19257 Analytical Method: SW8260C Instrument: VQA 7890/5975 GC/MS Analyst: NRO Prep Batch: VXX34574 Prep Method: SW5035A Prep Date/Time: 08/01/2019 06:00 Spike Init Wt./Vol.: 0.750 mg/Kg Extract Vol: 25 mL Dupe Init Wt./Vol.: Extract Vol:

Print Date: 08/08/2019 1:37:29PM



Matrix Spike Summary

Original Sample ID: 1194112001 MS Sample ID: 1523292 MS MSD Sample ID: 1523293 MSD Analysis Date: 08/01/2019 22:44 Analysis Date: 08/01/2019 21:24 Analysis Date: 08/01/2019 21:40 Matrix: Soil/Solid (dry weight)

QC for Samples: 1199567004, 1199567005, 1199567006, 1199567007

Results by SW8260C										
		Mat	rix Spike (n	ng/Kg)	Spike	Duplicate	(mg/Kg)			
Parameter	Sample	<u>Spike</u>	Result	<u>Rec (%)</u>	Spike	Result	<u>Rec (%)</u>	CL	<u>RPD (%)</u>	RPD CL
Benzene	0.0117U	1.28	1.36	106	1.28	1.38	108	77-121	1.60	(< 20)
Ethylbenzene	0.0233U	1.28	1.31	103	1.28	1.34	106	76-122	2.10	(< 20)
Naphthalene	0.0233U	1.28	1.25	98	1.28	1.23	96	62-129	2.00	(< 20)
o-Xylene	0.0233U	1.28	1.27	100	1.28	1.31	103	77-123	2.90	(< 20)
P & M -Xylene	0.0468U	2.55	2.51	98	2.55	2.57	101	77-124	2.50	(< 20)
Toluene	0.0233U	1.28	1.32	104	1.28	1.34	105	77-121	1.10	(< 20)
Xylenes (total)	0.0700U	3.83	3.79	99	3.83	3.88	102	78-124	2.70	(< 20)
Surrogates										
1,2-Dichloroethane-D4 (surr)		1.28	1.15	90	1.28	1.16	91	71-136	1.10	
4-Bromofluorobenzene (surr)		2.13	2.19	103	2.13	2.15	101	55-151	2.00	
Toluene-d8 (surr)		1.28	1.33	105	1.28	1.33	105	85-116	0.18	

Batch Information

Analytical Batch: VMS19257 Analytical Method: SW8260C Instrument: VQA 7890/5975 GC/MS Analyst: NRO Analytical Date/Time: 8/1/2019 9:24:00PM Prep Batch: VXX34574 Prep Method: Vol. Extraction SW8260 Field Extracted L Prep Date/Time: 8/1/2019 6:00:00AM Prep Initial Wt./Vol.: 31.90g Prep Extract Vol: 25.00mL

Print Date: 08/08/2019 1:37:30PM

Method Blank

Blank ID: MB for HBN 1797416 [VXX/34577] Blank Lab ID: 1523317

QC for Samples: 1199567003, 1199567008

Results by SW8260C

<u>Parameter</u>	<u>Results</u>	LOQ/CL	<u>DL</u>	<u>Units</u>
Benzene	0.00625U	0.0125	0.00390	mg/Kg
Ethylbenzene	0.0125U	0.0250	0.00780	mg/Kg
Naphthalene	0.0125U	0.0250	0.00780	mg/Kg
o-Xylene	0.0125U	0.0250	0.00780	mg/Kg
P & M -Xylene	0.0250U	0.0500	0.0150	mg/Kg
Toluene	0.0125U	0.0250	0.00780	mg/Kg
Xylenes (total)	0.0375U	0.0750	0.0228	mg/Kg
Surrogates				
1,2-Dichloroethane-D4 (surr)	94.5	71-136		%
4-Bromofluorobenzene (surr)	104	55-151		%
Toluene-d8 (surr)	104	85-116		%

Batch Information

Analytical Batch: VMS19261 Analytical Method: SW8260C Instrument: VQA 7890/5975 GC/MS Analyst: NRO Analytical Date/Time: 8/2/2019 4:53:00PM Prep Batch: VXX34577 Prep Method: SW5035A Prep Date/Time: 8/2/2019 6:00:00AM Prep Initial Wt./Vol.: 50 g Prep Extract Vol: 25 mL

Matrix: Soil/Solid (dry weight)

Print Date: 08/08/2019 1:37:32PM



Blank Spike ID: LCS for HBN 1199567 [VXX34577] Blank Spike Lab ID: 1523318 Date Analyzed: 08/02/2019 17:09

Matrix: Soil/Solid (dry weight)

QC for Samples: 1199567003, 1199567008

Results by SW8260C

	E	Blank Spike	(mg/Kg)	
<u>Parameter</u>	Spike	Result	<u>Rec (%)</u>	
Benzene	0.750	0.768	102	
Ethylbenzene	0.750	0.768	102	
Naphthalene	0.750	0.708	94	
o-Xylene	0.750	0.747	100	
P & M -Xylene	1.50	1.49	100	
Toluene	0.750	0.777	104	
Xylenes (total)	2.25	2.24	100	
Surrogates				
1,2-Dichloroethane-D4 (surr)	0.750	86.3	86	
4-Bromofluorobenzene (surr)	0.750	100	100	
Toluene-d8 (surr)	0.750	108	108	

Batch Information

Analytical Batch: VMS19261 Analytical Method: SW8260C Instrument: VQA 7890/5975 GC/MS Analyst: NRO Prep Batch: VXX34577 Prep Method: SW5035A Prep Date/Time: 08/02/2019 06:00 Spike Init Wt./Vol.: 0.750 mg/Kg Extract Vol: 25 mL Dupe Init Wt./Vol.: Extract Vol:

Print Date: 08/08/2019 1:37:34PM



Matrix Spike Summary

Results by SW8260C

Original Sample ID: 1194219009 MS Sample ID: 1523319 MS MSD Sample ID: 1523320 MSD

QC for Samples: 1199567003, 1199567008

Analysis Date: 08/03/2019 0:11 Analysis Date: 08/02/2019 22:03 Analysis Date: 08/02/2019 22:19 Matrix: Soil/Solid (dry weight)

		Mat	rix Spike (r	ng/Kg)	Spike	Duplicate	(mg/Kg)			
Parameter_	Sample	Spike	Result	<u>Rec (%)</u>	Spike	Result	<u>Rec (%)</u>	CL	<u>RPD (%)</u>	RPD CL
Benzene	0.0297U	2.73	2.98	109	2.73	2.98	109	77-121	0.17	(< 20)
Ethylbenzene	0.0595U	2.73	2.98	109	2.73	2.98	109	76-122	0.14	(< 20)
Naphthalene	0.0595U	2.73	2.59	95	2.73	2.64	97	62-129	1.70	(< 20)
Toluene	0.0595U	2.73	2.90	106	2.73	2.90	106	77-121	0.01	(< 20)
Xylenes (total)	0.178U	8.19	8.69	106	8.19	8.72	106	78-124	0.29	(< 20)
Surrogates										
1,2-Dichloroethane-D4 (surr)		2.73	2.40	88	2.73	2.40	88	71-136	0.23	
4-Bromofluorobenzene (surr)		4.54	4.13	91	4.54	4.13	91	55-151	0.05	
Toluene-d8 (surr)		2.73	2.84	104	2.73	2.84	104	85-116	0.43	

Batch Information

Analytical Batch: VMS19261 Analytical Method: SW8260C Instrument: VQA 7890/5975 GC/MS Analyst: NRO Analytical Date/Time: 8/2/2019 10:03:00PM Prep Batch: VXX34577 Prep Method: Vol. Extraction SW8260 Field Extracted L Prep Date/Time: 8/2/2019 6:00:00AM Prep Initial Wt./Vol.: 21.44g Prep Extract Vol: 25.00mL

Print Date: 08/08/2019 1:37:35PM

Method Blank

Blank ID: MB for HBN 1797431 [VXX/34581] Blank Lab ID: 1523364

QC for Samples: 1199567001, 1199567002

Results by SW8260C

<u>Parameter</u>	<u>Results</u>	LOQ/CL	<u>DL</u>	<u>Units</u>
Benzene	0.00625U	0.0125	0.00390	mg/Kg
Ethylbenzene	0.0125U	0.0250	0.00780	mg/Kg
o-Xylene	0.0125U	0.0250	0.00780	mg/Kg
P & M -Xylene	0.0250U	0.0500	0.0150	mg/Kg
Toluene	0.0125U	0.0250	0.00780	mg/Kg
Xylenes (total)	0.0375U	0.0750	0.0228	mg/Kg
Surrogates				
1,2-Dichloroethane-D4 (surr)	100	71-136		%
4-Bromofluorobenzene (surr)	100	55-151		%
Toluene-d8 (surr)	98.5	85-116		%

Batch Information

Analytical Batch: VMS19265 Analytical Method: SW8260C Instrument: VRA Agilent GC/MS 7890B/5977A Analyst: NRO Analytical Date/Time: 8/1/2019 11:07:00PM Prep Batch: VXX34581 Prep Method: SW5035A Prep Date/Time: 8/1/2019 6:00:00AM Prep Initial Wt./Vol.: 50 g Prep Extract Vol: 25 mL

Matrix: Soil/Solid (dry weight)

Print Date: 08/08/2019 1:37:36PM



Blank Spike ID: LCS for HBN 1199567 [VXX34581] Blank Spike Lab ID: 1523365 Date Analyzed: 08/01/2019 23:22

Matrix: Soil/Solid (dry weight)

QC for Samples: 1199567001, 1199567002

Results by SW8260C

	E	Blank Spike	(mg/Kg)	
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>
Benzene	0.750	0.756	101	(77-1
Ethylbenzene	0.750	0.744	99	(76-12
o-Xylene	0.750	0.727	97	(77-123
P & M -Xylene	1.50	1.44	96	(77-124
Toluene	0.750	0.682	91	(77-121
Xylenes (total)	2.25	2.17	97	(78-124
Surrogates				
1,2-Dichloroethane-D4 (surr)	0.750	97.8	98	(71-136
4-Bromofluorobenzene (surr)	0.750	96.5	97	(55-151
Toluene-d8 (surr)	0.750	101	101	(85-116

Batch Information

Analytical Batch: VMS19265 Analytical Method: SW8260C Instrument: VRA Agilent GC/MS 7890B/5977A Analyst: NRO Prep Batch: VXX34581 Prep Method: SW5035A Prep Date/Time: 08/01/2019 06:00 Spike Init Wt./Vol.: 0.750 mg/Kg Extract Vol: 25 mL Dupe Init Wt./Vol.: Extract Vol:

Print Date: 08/08/2019 1:37:37PM



Matrix Spike Summary

Results by SW8260C

Original Sample ID: 1194219012 MS Sample ID: 1523366 MS MSD Sample ID: 1523367 MSD

QC for Samples: 1199567001, 1199567002

Analysis Date: 08/02/2019 1:41 Analysis Date: 08/01/2019 23:38 Analysis Date: 08/01/2019 23:53 Matrix: Soil/Solid (dry weight)

		Mat	rix Spike (r	ng/Kg)	Spike	Duplicate	(mg/Kg)			
Parameter	Sample	Spike	Result	<u>Rec (%)</u>	Spike	Result	<u>Rec (%)</u>	CL	<u>RPD (%)</u>	RPD CL
Benzene	0.00985U	1.19	1.19	101	1.19	1.21	102	77-121	1.30	(< 20)
Ethylbenzene	0.0197U	1.19	1.17	98	1.19	1.20	101	76-122	3.20	(< 20)
Toluene	0.0197U	1.19	1.07	91	1.19	1.09	92	77-121	1.30	(< 20)
Xylenes (total)	0.0590U	3.55	3.40	96	3.55	3.50	99	78-124	2.90	(< 20)
Surrogates										
1,2-Dichloroethane-D4 (surr)		1.19	1.13	96	1.19	1.17	99	71-136	2.70	
4-Bromofluorobenzene (surr)		1.64	1.73	105	1.64	1.75	107	55-151	1.40	
Toluene-d8 (surr)		1.19	1.19	101	1.19	1.18	100	85-116	1.40	

Batch Information

Analytical Batch: VMS19265 Analytical Method: SW8260C Instrument: VRA Agilent GC/MS 7890B/5977A Analyst: NRO Analytical Date/Time: 8/1/2019 11:38:00PM Prep Batch: VXX34581 Prep Method: Vol. Extraction SW8260 Field Extracted L Prep Date/Time: 8/1/2019 6:00:00AM Prep Initial Wt./Vol.: 43.04g Prep Extract Vol: 29.99mL

Print Date: 08/08/2019 1:37:38PM

Method Blank

Blank ID: MB for HBN 1797581 [VXX/34598] Blank Lab ID: 1524069 Matrix: Soil/Solid (dry weight)

QC for Samples: 1199567004, 1199567005, 1199567006

Results by SW8260C

Benzene 0.00625U 0.0125 0.00390 mg/K o-Xylene 0.0125U 0.0250 0.00780 mg/K P & M -Xylene 0.0250U 0.0500 0.0150 mg/K Toluene 0.0125U 0.0250 0.00780 mg/K Xylenes (total) 0.0375U 0.0250 0.00780 mg/K Surrogates 1,2-Dichloroethane-D4 (surr) 99.5 71-136 %	Parameter	<u>Results</u>	LOQ/CL	<u>DL</u>	<u>Units</u>
o-Xylene 0.0125U 0.0250 0.00780 mg/K P & M -Xylene 0.0250U 0.0500 0.0150 mg/K Toluene 0.0125U 0.0250 0.00780 mg/K Xylenes (total) 0.0375U 0.02750 0.0228 mg/K Surrogates 1,2-Dichloroethane-D4 (surr) 99.5 71-136 %	Benzene	0.00625U	0.0125	0.00390	mg/Kg
P & M -Xylene 0.0250U 0.0500 0.0150 mg/K Toluene 0.0125U 0.0250 0.00780 mg/K Xylenes (total) 0.0375U 0.0750 0.0228 mg/K Surrogates 1,2-Dichloroethane-D4 (surr) 99.5 71-136 %	o-Xylene	0.0125U	0.0250	0.00780	mg/Kg
Toluene 0.0125U 0.0250 0.00780 mg/K Xylenes (total) 0.0375U 0.0750 0.0228 mg/K Surrogates 1,2-Dichloroethane-D4 (surr) 99.5 71-136 %	P & M -Xylene	0.0250U	0.0500	0.0150	mg/Kg
Xylenes (total) 0.0375U 0.0750 0.0228 mg/K Surrogates 1,2-Dichloroethane-D4 (surr) 99.5 71-136 % 1 Demosflware function of the surrow o	Toluene	0.0125U	0.0250	0.00780	mg/Kg
Surrogates 1,2-Dichloroethane-D4 (surr) 99.5 71-136 % 4 Drame fluench angene (surr) 00.0	Xylenes (total)	0.0375U	0.0750	0.0228	mg/Kg
1,2-Dichloroethane-D4 (surr) 99.5 71-136 %	Surrogates				
	1,2-Dichloroethane-D4 (surr)	99.5	71-136		%
4-Bromofluorobenzene (surr) 99.3 55-151 %	4-Bromofluorobenzene (surr)	99.3	55-151		%
Toluene-d8 (surr) 100 85-116 %	Toluene-d8 (surr)	100	85-116		%

Batch Information

Analytical Batch: VMS19273 Analytical Method: SW8260C Instrument: VRA Agilent GC/MS 7890B/5977A Analyst: NRO Analytical Date/Time: 8/5/2019 3:50:00AM Prep Batch: VXX34598 Prep Method: SW5035A Prep Date/Time: 8/4/2019 6:00:00AM Prep Initial Wt./Vol.: 50 g Prep Extract Vol: 25 mL

Print Date: 08/08/2019 1:37:40PM



Print Date: 08/08/2019 1:37:41PM



Matrix Spike Summary

Original Sample ID: 1194207010 MS Sample ID: 1524071 MS MSD Sample ID: 1524072 MSD Analysis Date: 08/05/2019 6:09 Analysis Date: 08/05/2019 4:21 Analysis Date: 08/05/2019 4:37 Matrix: Soil/Solid (dry weight)

QC for Samples: 1199567004, 1199567005, 1199567006

	Matrix Spike (mg/Kg)		ng/Kg)	Spike Duplicate (mg/Kg)					
Sample	Spike	Result	<u>Rec (%)</u>	Spike	Result	<u>Rec (%)</u>	CL	<u>RPD (%)</u>	RPD CL
0.00457U	0.415	0.420	101	0.415	0.427	103	77-121	1.60	(< 20)
0.00619J	0.415	0.395	94	0.415	0.404	96	77-123	2.20	(< 20)
0.0183U	0.830	0.785	95	0.830	0.801	97	77-124	1.90	(< 20)
0.00915U	0.415	0.378	91	0.415	0.387	93	77-121	2.30	(< 20)
	0.415	0.400	96	0.415	0.403	97	71-136	0.79	
	0.692	0.488	71	0.692	0.471	68	55-151	3.70	
	0.415	0.412	99	0.415	0.423	102	85-116	2.50	
	Sample 0.00457U 0.00619J 0.0183U 0.00915U	Sample Spike 0.00457U 0.415 0.00619J 0.415 0.0183U 0.830 0.00915U 0.415 0.692 0.415	Sample Spike Result 0.00457U 0.415 0.420 0.00619J 0.415 0.395 0.0183U 0.830 0.785 0.00915U 0.415 0.378 0.415 0.378 0.00915U 0.415 0.400 0.692 0.488 0.415 0.412	Sample Spike Result Rec (%) 0.00457U 0.415 0.420 101 0.00619J 0.415 0.395 94 0.0183U 0.830 0.785 95 0.00915U 0.415 0.378 91 0.415 0.400 0.00915U 0.415 0.410 96 0.692 0.488 71 0.415 0.412 99	Matrix Spike (mg/Kg) Spike Sample Spike Result Rec (%) Spike 0.00457U 0.415 0.420 101 0.415 0.00619J 0.415 0.395 94 0.415 0.0183U 0.830 0.785 95 0.830 0.00915U 0.415 0.378 91 0.415 0.6092 0.488 71 0.692 0.415 0.415 0.412 99 0.415	Matrix Spike (mg/Kg) Spike Duplicate Sample Spike Result Rec (%) Spike Result 0.00457U 0.415 0.420 101 0.415 0.427 0.00619J 0.415 0.395 94 0.415 0.404 0.0183U 0.830 0.785 95 0.830 0.801 0.00915U 0.415 0.378 91 0.415 0.387 0.415 0.400 96 0.415 0.403 0.692 0.488 71 0.692 0.415 0.415 0.412 99 0.415 0.423	Matrix Spike (mg/Kg) Spike Duplicate (mg/Kg) Sample Spike Result Rec (%) Spike Result Rec (%) 0.00457U 0.415 0.420 101 0.415 0.427 103 0.00619J 0.415 0.395 94 0.415 0.404 96 0.0183U 0.830 0.785 95 0.830 0.801 97 0.00915U 0.415 0.378 91 0.415 0.387 93 0.415 0.400 96 0.415 0.403 97 0.692 0.488 71 0.692 0.471 68 0.415 0.412 99 0.415 0.423 102	Matrix Spike (mg/Kg) Spike Duplicate (mg/Kg) Sample Spike Result Rec (%) Spike Result Rec (%) CL 0.00457U 0.415 0.420 101 0.415 0.427 103 77-121 0.00619J 0.415 0.395 94 0.415 0.404 96 77-123 0.0183U 0.830 0.785 95 0.830 0.801 97 77-124 0.00915U 0.415 0.378 91 0.415 0.387 93 77-121 0.00915U 0.415 0.400 96 0.415 0.387 93 77-121 0.00915U 0.415 0.400 96 0.415 0.403 97 71-136 0.692 0.488 71 0.692 0.471 68 55-151 0.415 0.412 99 0.415 0.423 102 85-116	Matrix Spike (mg/Kg) Spike Duplicate (mg/Kg) Sample Spike Result Rec (%) Spike Result Rep (%) 0.00457U 0.415 0.420 101 0.415 0.427 103 77-121 1.60 0.00619J 0.415 0.395 94 0.415 0.404 96 77-123 2.20 0.0183U 0.830 0.785 95 0.830 0.801 97 77-124 1.90 0.00915U 0.415 0.378 91 0.415 0.387 93 77-121 2.30 0.415 0.400 96 0.415 0.403 97 71-136 0.79 0.692 0.488 71 0.692 0.471 68 55-151 3.70 0.415 0.412 99 0.415 0.423 102 85-116 2.50

Batch Information

Analytical Batch: VMS19273 Analytical Method: SW8260C Instrument: VRA Agilent GC/MS 7890B/5977A Analyst: NRO Analytical Date/Time: 8/5/2019 4:21:00AM Prep Batch: VXX34598 Prep Method: Vol. Extraction SW8260 Field Extracted L Prep Date/Time: 8/4/2019 6:00:00AM Prep Initial Wt./Vol.: 98.47g Prep Extract Vol: 25.00mL

Print Date: 08/08/2019 1:37:43PM

Method Blank

Blank ID: MB for HBN 1797254 [XXX/41900] Blank Lab ID: 1522679

QC for Samples: 1199567002

Results by 8270D SIM (PAH)

<u>Parameter</u>	<u>Results</u>	LOQ/CL	<u>DL</u>	<u>Units</u>
1-Methylnaphthalene	0.0125U	0.0250	0.00625	mg/Kg
2-Methylnaphthalene	0.0125U	0.0250	0.00625	mg/Kg
Acenaphthene	0.0125U	0.0250	0.00625	mg/Kg
Acenaphthylene	0.0125U	0.0250	0.00625	mg/Kg
Anthracene	0.0125U	0.0250	0.00625	mg/Kg
Benzo(a)Anthracene	0.0125U	0.0250	0.00625	mg/Kg
Benzo[a]pyrene	0.0125U	0.0250	0.00625	mg/Kg
Benzo[b]Fluoranthene	0.0125U	0.0250	0.00625	mg/Kg
Benzo[g,h,i]perylene	0.0125U	0.0250	0.00625	mg/Kg
Benzo[k]fluoranthene	0.0125U	0.0250	0.00625	mg/Kg
Chrysene	0.0125U	0.0250	0.00625	mg/Kg
Dibenzo[a,h]anthracene	0.0125U	0.0250	0.00625	mg/Kg
Fluoranthene	0.0125U	0.0250	0.00625	mg/Kg
Fluorene	0.0125U	0.0250	0.00625	mg/Kg
Indeno[1,2,3-c,d] pyrene	0.0125U	0.0250	0.00625	mg/Kg
Naphthalene	0.0100U	0.0200	0.00500	mg/Kg
Phenanthrene	0.0125U	0.0250	0.00625	mg/Kg
Pyrene	0.0125U	0.0250	0.00625	mg/Kg
Surrogates				
2-Methylnaphthalene-d10 (surr)	81.8	58-103		%
Fluoranthene-d10 (surr)	81.7	54-113		%

Batch Information

Analytical Batch: XMS11595 Analytical Method: 8270D SIM (PAH) Instrument: Agilent GC 7890B/5977A SWA Analyst: DSD Analytical Date/Time: 8/3/2019 1:56:00PM Prep Batch: XXX41900 Prep Method: SW3550C Prep Date/Time: 8/1/2019 8:02:11AM Prep Initial Wt./Vol.: 22.5 g Prep Extract Vol: 5 mL

Matrix: Soil/Solid (dry weight)

Print Date: 08/08/2019 1:37:43PM

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Blank Spike ID: LCS for HBN 1199567 [XXX41900] Blank Spike Lab ID: 1522680 Date Analyzed: 08/03/2019 14:16

Matrix: Soil/Solid (dry weight)

QC for Samples: 1199567002

Results by 8270D SIM (PAH)

	В	lank Spike	(mg/Kg)	
Parameter_	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>
1-Methylnaphthalene	0.111	0.0995	90	(43-111)
2-Methylnaphthalene	0.111	0.0996	90	(39-114)
Acenaphthene	0.111	0.0950	86	(44-111)
Acenaphthylene	0.111	0.104	94	(39-116)
Anthracene	0.111	0.0977	88	(50-114)
Benzo(a)Anthracene	0.111	0.100	90	(54-122)
Benzo[a]pyrene	0.111	0.0990	89	(50-125)
Benzo[b]Fluoranthene	0.111	0.105	95	(53-128)
Benzo[g,h,i]perylene	0.111	0.103	92	(49-127)
Benzo[k]fluoranthene	0.111	0.0963	87	(56-123)
Chrysene	0.111	0.0993	89	(57-118)
Dibenzo[a,h]anthracene	0.111	0.102	92	(50-129)
Fluoranthene	0.111	0.105	94	(55-119)
Fluorene	0.111	0.101	91	(47-114)
Indeno[1,2,3-c,d] pyrene	0.111	0.108	98	(49-130)
Naphthalene	0.111	0.0944	85	(38-111)
Phenanthrene	0.111	0.0980	88	(49-113)
Pyrene	0.111	0.109	98	(55-117)
Surrogates				
2-Methylnaphthalene-d10 (surr)	0.111	82.3	82	(58-103)
Fluoranthene-d10 (surr)	0.111	83.2	83	(54-113)

Batch Information

Analytical Batch: XMS11595 Analytical Method: 8270D SIM (PAH) Instrument: Agilent GC 7890B/5977A SWA Analyst: DSD Prep Batch: XXX41900 Prep Method: SW3550C Prep Date/Time: 08/01/2019 08:02 Spike Init Wt./Vol.: 0.111 mg/Kg Extract Vol: 5 mL Dupe Init Wt./Vol.: Extract Vol:

Print Date: 08/08/2019 1:37:45PM

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Matrix Spike Summary

Original Sample ID: 1194123012 MS Sample ID: 1522681 MS MSD Sample ID: 1522682 MSD
 Analysis Date:
 08/03/2019
 15:39

 Analysis Date:
 08/03/2019
 15:59

 Analysis Date:
 08/03/2019
 16:20

 Matrix:
 Soil/Solid (dry weight)
 16:20

QC for Samples: 1199567002

Results by 8270D SIM (PAH)

		Matri	x Spike (m	g/Kg)	Spike	Duplicate ((mg/Kg)			
Parameter	Sample	Spike	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	CL	<u>RPD (%)</u>	RPD CL
1-Methylnaphthalene	0.0131U	0.115	0.103	89	0.116	0.103	89	43-111	0.45	(< 20)
2-Methylnaphthalene	0.0131U	0.115	0.104	90	0.116	0.104	89	39-114	0.01	(< 20)
Acenaphthene	0.0131U	0.115	0.0979	85	0.116	0.0977	84	44-111	0.23	(< 20)
Acenaphthylene	0.0131U	0.115	0.107	93	0.116	0.106	90	39-116	1.30	(< 20)
Anthracene	0.0131U	0.115	0.100	87	0.116	0.0993	85	50-114	1.10	(< 20)
Benzo(a)Anthracene	0.0131U	0.115	0.104	90	0.116	0.106	90	54-122	1.60	(< 20)
Benzo[a]pyrene	0.0131U	0.115	0.105	91	0.116	0.107	91	50-125	2.00	(< 20)
Benzo[b]Fluoranthene	0.0131U	0.115	0.107	93	0.116	0.109	93	53-128	1.70	(< 20)
Benzo[g,h,i]perylene	0.0131U	0.115	0.106	92	0.116	0.108	93	49-127	1.90	(< 20)
Benzo[k]fluoranthene	0.0131U	0.115	0.103	89	0.116	0.103	88	56-123	0.12	(< 20)
Chrysene	0.0131U	0.115	0.104	91	0.116	0.106	91	57-118	1.50	(< 20)
Dibenzo[a,h]anthracene	0.0131U	0.115	0.107	93	0.116	0.109	93	50-129	1.30	(< 20)
Fluoranthene	0.0131U	0.115	0.107	93	0.116	0.109	94	55-119	1.70	(< 20)
Fluorene	0.0131U	0.115	0.104	90	0.116	0.103	88	47-114	1.30	(< 20)
Indeno[1,2,3-c,d] pyrene	0.0131U	0.115	0.112	98	0.116	0.114	98	49-130	1.40	(< 20)
Naphthalene	0.0104U	0.115	0.0999	87	0.116	0.100	86	38-111	0.09	(< 20)
Phenanthrene	0.0131U	0.115	0.100	87	0.116	0.100	86	49-113	0.27	(< 20)
Pyrene	0.0131U	0.115	0.112	98	0.116	0.112	96	55-117	0.65	(< 20)
Surrogates										
2-Methylnaphthalene-d10 (surr)		0.115	0.0930	81	0.116	0.0916	79	58-103	1.50	
Fluoranthene-d10 (surr)		0.115	0.0946	82	0.116	0.0953	82	54-113	0.73	

Batch Information

Analytical Batch: XMS11595 Analytical Method: 8270D SIM (PAH) Instrument: Agilent GC 7890B/5977A SWA Analyst: DSD Analytical Date/Time: 8/3/2019 3:59:00PM Prep Batch: XXX41900 Prep Method: Sonication Extr Soil 8270 PAH SIM 5ml Prep Date/Time: 8/1/2019 8:02:11AM Prep Initial Wt./Vol.: 22.95g Prep Extract Vol: 5.00mL

Print Date: 08/08/2019 1:37:46PM

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Method Blank]						
Blank ID: MB for HBN 179 Blank Lab ID: 1522739	07273 [XXX/41904]	Matrix	: Soil/Solid (dry weight)				
QC for Samples: 1199567001, 1199567002								
Results by AK102								
Parameter	<u>Results</u>	LOQ/CL	<u>DL</u>	<u>Units</u>				
Diesel Range Organics	12.3J	20.0	6.20	mg/Kg				
Surrogates								
5a Androstane (surr)	81.3	60-120		%				
Batch Information								
Analytical Batch: XFC152	206	Prep Bate	ch: XXX4190)4				
Analytical Method: AK10	2	Prep Met	Prep Method: SW3550C					
Analyst: VDL	DF	Prep Date Prep Initi	Prep Date/Time: 8/1/2019 12:14:51PM Prep Initial Wt /Vol : 30 g					
Analytical Date/Time: 8/2	2/2019 11:37:00AM	Prep Extr	act Vol: 5 m	L				

Print Date: 08/08/2019 1:37:47PM



Blank Spike ID: LCS for HBN 1199567 [XXX41904] Blank Spike Lab ID: 1522740 Date Analyzed: 08/02/2019 11:47 Spike Duplicate ID: LCSD for HBN 1199567 [XXX41904] Spike Duplicate Lab ID: 1522741 Matrix: Soil/Solid (dry weight)

QC for Samples: 1199567001, 1199567002

Results by AK102			_						
	E	Blank Spike	(mg/Kg)	ng/Kg) Spike Duplicate (mg/Kg)					
<u>Parameter</u>	Spike	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>	<u>RPD (%)</u>	RPD CL
Diesel Range Organics	833	788	95	833	781	94	(75-125)	0.94	(< 20)
Surrogates									
5a Androstane (surr)	16.7	86.8	87	16.7	86.1	86	(60-120)	0.72	
Batch Information									
Analytical Batch: XFC15206 Analytical Method: AK102	Prep Batch: XXX41904 Prep Method: SW3550C								
Instrument: Agilent 7890B F				Pre	p Date/Tim	e: 08/01/201	9 12:14		
Analyst: VDL	Spike Init Wt./Vol.: 833 mg/Kg Extract Vol: 5 mL Dupe Init Wt./Vol.: 833 mg/Kg Extract Vol: 5 mL								

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SGS	
the second of the second of the second of the	

Method Blank]							
Blank ID: MB for HBN 179 Blank Lab ID: 1522994	7333 [XXX/41915]	Matrix	:: Soil/Solid (dry weight)				
QC for Samples: 1199567003								
Results by AK102								
Parameter	<u>Results</u>	LOQ/CL	DL	Units				
Diesel Range Organics	10.0U	20.0	6.20	mg/Kg				
Surrogates								
5a Androstane (surr)	85.7	60-120		%				
Batch Information								
Analytical Batch: XFC152	211	Prep Bat	ch: XXX4191	5				
Analytical Method: AK102	2	Prep Me	thod: SW355	0C				
Instrument: Agilent 7890	BR	Prep Dat	Prep Date/Time: 8/2/2019 1:01:18PM					
Analyst: VDL Analytical Date/Time: 8/5	5/2019 9·33·00AM	Prep Init Prep Ext	ract Vol: 5 ml	υg				
				-				

Print Date: 08/08/2019 1:37:50PM



Blank Spike ID: LCS for HBN 1199567 [XXX41915] Blank Spike Lab ID: 1522995 Date Analyzed: 08/05/2019 09:43 Spike Duplicate ID: LCSD for HBN 1199567 [XXX41915] Spike Duplicate Lab ID: 1522996 Matrix: Soil/Solid (dry weight)

QC for Samples: 1199567003

Results by AK102			_						
	E	Blank Spike	(mg/Kg) Spike Duplicate (mg/Kg)						
Parameter	Spike	Result	<u>Rec (%)</u>	Spike	Result	<u>Rec (%)</u>	<u>CL</u>	<u>RPD (%)</u>	RPD CL
Diesel Range Organics	833	852	102	833	847	102	(75-125)	0.55	(< 20)
Surrogates									
5a Androstane (surr)	16.7	94.7	95	16.7	94	94	(60-120)	0.75	
Batch Information									
Analytical Batch: XFC15211 Analytical Method: AK102 Instrument: Agilent 7890B R Analyst: VDL	Prep Batch: XXX41915 Prep Method: SW3550C Prep Date/Time: 08/02/2019 13:01 Spike Init Wt./Vol.: 833 mg/Kg Extract Vol: 5 mL						Vol: 5 mL		
				Dup	e Init Wt./\	/ol.: 833 mg	/Kg Extract	Vol: 5 mL	

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	Laboratory Sca of I of Attn: Attn: servative if used)	Andrew State Configure Andrew State Sample Containers Sample Containers Hot Sample Containers Sample Containers Sample Containers Samel
	ECORD Analytical Methods (include pre	Signature: Time: Date: Data: Date: Data: Date: Data: D
1199567		A A X X X X X X X X X X X X X X X X X X
	CHAIN-O	o:: Yes No Time Sampled Time Sampled 11:50 713/19 13:06 713/19 13:06 713/19 13:06 713/19 13:06 713/19 13:06 713/19 13:06 713/19 11:50 713/19 11:50 713/19 11:50 713/19 11:50 713/19 11:50 713/19 11:50 713/19 11:50 713/19 12:01 10050 12:01 10050 12:01 10050 12:01 10050 12:01 10050 13:01 10050 14:01 10050 15:01 10050 15:01 10050 15:01 10050 15:01 10050 15:01 10050 15:01 10050 15:01 10050 15:01 10050 15:01 10050 15:01 10050 15:01 10050 16:01 10050 17:01 10050 17:01 10050
	EXAMINON & WLSON, INC. 2355 Hill Road Fairbanks, AK 99709 (907) 479-0600 www.shannonwilson.com	Turm Around Time: Cuote N Turm Around Time: Rush Please Specify Lab No Sample Identity Lab No Sample Identity Lab No Ser19-01-55 0.4 0 SR-19-01-755 0.4 0 SR-19-03-7.6,5 0.4 0 SR-19-03-7.5 0.4 0 SR-19-03-7.5 0.4 0 SR-19-03-7.5 0.4 0 SR-19-03-7.5 0.4 0 Ser19-03-7.5 0.4 0 Ser19-03-05 0.4 0 Ser10-05 0.4 0

No. 411417

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e-Sample Receipt Form

CCC	e-Sam <u>r</u>	ole Receip	t Form			
202	SGS Workorder #:	1	1995	67		99567
Rev	view Criteria	Condition (Yes,	, No, N/A	Exe	ceptions No	ted below
Chain of	f Custody / Temperature Requir	rements	N	I/A Exemption p	ermitted if sam	pler hand carries/delivers
	Were Custody Seals intact? Note # & I	location Yes	1F 1B			
	COC accompanied sa	amples? Yes	ļ			
DOD: Were sa	amples received in COC corresponding c	oolers?		. (· · · · · · · · · · · · · · · · · · ·
Tomporat	**Exemption permitted in		cted <8 hou	urs ago, or for sa	mples where c	hilling is not required
remperati	FCF)? Yes	Cooler ID.	'	@		
If samples received without a	temperature blank, the "cooler temperature" will	be	Cooler ID.		@	
cumented instead & "COOLER T	EMP" will be noted to the right. "ambient" or "chi	illed" will	Cooler ID		@	
De no	oted if neither is available.		Cooler ID		@	°C Therm. ID:
*lf >6	°C. were samples collected <8 hours					91101111.12.
	o, no. c camp		ll T			
	If <0°C, were sample containers ice	e free? N/A				
Note: Identify containe	ers received at non-compliant temper	rature .				
l	Use form FS-0029 if more space is n	eeded.				
Holding Time / D	ocumentation / Sample Condition Re	equirements	Note: Refer	to form F-083 "Sam	ple Guide" for sp	ecific holding times.
V	Vere samples received within holding	g time? Yes	<u>i</u>			
De complete meteb CO	Ott (:					
Do samples match COC	C** (I.e., sample IDS, dates/times colle	cted) / res	4			
NOTE. IT UTITES UTIT	rer <1 hr, record details & login per of	UC.				
*Note: If sample information on co	Sontainers differs from COC, SGS will delault to C					
Were analytical requests c with mu	lear? (I.e., method is specified for an ltiple option for analysis (Ex: BTEX.)	alyses	4			
With first		victuroj				
			╉─────	***Exemptio	n permitted for	motals (e.g. 200 8/6020A)
Were proper container	vs (type/mass/volume/preservative***)	Jused? Yes			I permitted for	1118 (a.g. 200.0/00207)
	s (type/mass/volume/proservaire)					
	Volatile / LL-Hg Reg	uirements				
Were Trip Blanks	(i.e., VOAs, LL-Hg) in cooler with sar	mples? Yes				
Were all water VOA vial	Is free of headspace (i.e., bubbles ≤ (6mm)? N/A	1			
Were all	soil VOAs field extracted with MeOH	+BFB? Yes				
Note to Clie	ant: Any "No", answer above indicates nor	n-compliance	with standa	ard procedures a	nd may impact	data quality.
	Additiona	i <mark>l notes (it a</mark>	ipplicable):		

e-Sampl <u>e Receipt Form FBK</u>										
202	SGS Workorder	#:	1199		567	1199567				
Revie	Review Criteria Condition					Io, N/A Exceptions Noted below				
Chain of Custody / Temperature Requirements Yes Exemption permitted if sampler hand carries/									/ers.	
1	Were Custody Seals intact? Note #	# & location	N/A							
	COC accompanied	d samples?	Yes							
DOD: Were sam	ples received in COC correspondir	ng coolers?	N/A							
	**Exemption permittee	d if chilled 8	k colle	cted <8 ho	ours ago, or for sam	ples where cl	nilling is not	required		
Temperature	e blank compliant* (i.e., 0-6 °C a	after CF)?	Yes	Cooler ID	<mark>):</mark> 1	@	3.6 °C T	herm. ID:	D54	
				Cooler ID	D:	@	۲D°	herm. ID:		
documented instead & "COOLER TEM	Perature blank, the "cooler temperature" IP" will be noted to the right. "ambient" or	' will be r "chilled" will		Cooler ID	D:	@	۲D°	herm. ID:		
be noted	d if neither is available.			Cooler ID	D:	@	۲D°	herm. ID:		

*lt >6°C	, were samples collected <8 ho	ours ago?								
12	20°C wore comple containers	ion france								
11	<0 C, were sample containers	ice free?								
Note: Identify containers Us	received at non-compliant tem e form FS-0029 if more space is	perature . s needed.								
Holding Time / Doc	umentation / Sample Condition	Requirem	nents	Note: Ref	er to form F-083 "S	ample Guide"	for specific	holding ti	mes.	
Do samples match COC*	* (i.e.,sample IDs,dates/times c	ollected)?	N/C			•	·			
**Note: If times differ <1hr, record details & login per COC.										
***Note: If sample information on conta	ainers differs from COC, SGS will default	to COC inform	mation							
Were samples in goo	od condition (no leaks/cracks/br	reakage)?	Yes	See rema	arks for samples t	hat are Hot.				
Were analytical requests clea with multip	ar? (i.e., method is specified for ole option for analysis (Ex: BTE)	r analyses X, Metals)	Yes							
Were Trip Blanks (i.e	e., VOAs, LL-Hg) in cooler with	samples?	Yes							
Were all water VOA vials f	ree of headspace (i.e., bubbles	s ≤ 6mm)?	N/A							
Were all so	Were all soil VOAs field extracted with MeOH+BFB? N/C									
For Rush/Short Hol	d Time, was RUSH/Short HT er	mail sent?	N/A							
Note to Client	: Any "No", answer above indicates	non-compli	ance v	with stand	ard procedures and	I may impact	data quality.			
	Additic	onal notes	s (if a	oplicable	e):					
SGS Profile	# 337	923			337	7923				



Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	Container Condition	<u>Container Id</u>	<u>Preservative</u>	<u>Container</u> Condition
1199567001-A	No Preservative Required	ОК			
1199567001-B	Methanol field pres. 4 C	ОК			
1199567002-A	No Preservative Required	ОК			
1199567002-B	Methanol field pres. 4 C	ОК			
1199567003-A	No Preservative Required	ОК			
1199567003-B	Methanol field pres. 4 C	ОК			
1199567004-A	Methanol field pres. 4 C	ОК			
1199567005-A	Methanol field pres. 4 C	ОК			
1199567006-A	Methanol field pres. 4 C	ОК			
1199567007-A	Methanol field pres. 4 C	ОК			
1199567008-A	Methanol field pres. 4 C	ОК			

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates than an inappropriate container was submitted.

- OK The container was received at an acceptable pH for the analysis requested.
- BU The container was received with headspace greater than 6mm.
- DM The container was received damaged.
- FR The container was received frozen and not usable for Bacteria or BOD analyses.
- IC The container provided for microbiology analysis was not a laboratory-supplied, pre-sterilized container and therefore was not suitable for analysis.

NC- The container provided was not preserved or was under-preserved. The method does not allow for additional preservative added after collection.

PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

Laboratory Data Review Checklist

Completed By:

Andrew Frick

Title:

Environmental Scientist

Date:

September 3, 2019

CS Report Name:

101752 Petro Star NPR

Report Date:

August 8, 2019

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

SGS North America, Inc.

Laboratory Report Number:

1199567

ADEC File Number:

100.38.102

Hazard Identification Number:

535

1199567

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

	Yes	© No	Comments:
b	o. If the sa alternate	mples were transferred block the laboratory, was the	ed to another "network" laboratory or sub-contracted to an laboratory performing the analyses ADEC CS approved?
	O Yes	No	Comments:
N/A; by th	all analyse ADEC C	es were performed by SP for the requested	y the SGS laboratory in Anchorage, AK. The laboratory is certified analyses.
<u>Chain c</u>	of Custody	<u>(CoC)</u>	
a. C	CoC inform	ation completed, sig	ned, and dated (including released/received by)?
	Yes	🔿 No	Comments:
b. C	Correct Ana	lyses requested?	
	Yes	🔿 No	Comments:
Laborat	tory Sampl	e Receipt Document	ation
	ampla/200	ler temperature docu	mented and within range at receipt $(0^{\circ} \text{ to } 6^{\circ} \text{ C})$?
a. S	ampie/coo		
a. S	• Yes	O No	Comments:
a. S	• Yes	© No	Comments:
a. S	• Yes	© No	Comments:
a. S b. S	Tes ample pres volatile Chi	© No ervation acceptable - orinated Solvents, et	Comments: - acidified waters, Methanol preserved VOC soil (GRO, BTEX, tc.)?

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

	Yes	🔿 No	Comments:
--	-----	------	-----------

The laboratory noted that samples were received in good condition.

1199567

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

○ Yes • No Comments:

There were no discrepancies noted in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and/or usability are not affected.

4. <u>Case Narrative</u>

a. Present and understandable?

• Yes • No Comments:

b. Discrepancies, errors, or QC failures identified by the lab?

• Yes • No Comments:

Recovery of GRO surrogate 4-bromofluorobenzene was outside of laboratory QC criteria in samples *SB19-01-7.5*, *SB19-03-6.5*, *SB19-103-6.5*, and *SB19-03-7.5* due to matrix interference.

DRO/RRO were detected in method blank 1522739 MB at a concentration greater than one half the LOQ, but less than the LOQ.

c. Were all corrective actions documented?

© Yes [●] No Comments:

No corrective actions were documented in the case narrative.

d. What is the effect on data quality/usability according to the case narrative?

Comments:

The case narrative did not note any effect on data quality/usability.

5. <u>Samples Results</u>

a. Correct analyses performed/reported as requested on COC?

Yes ONO

Comments:

1199567

b. All applicable holding times met?

• Yes • No Comments:

- c. All soils reported on a dry weight basis?
 - Yes O No Comments:
- d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

© Yes ● No Comments:

We compared the limits of detection (LOD) to the reported non-detect results to assess analytical sensitivity. The LOD for naphthalene exceeded the ADEC migration-to-groundwater soil cleanup level in project samples *SB-19-03-6.5*, *SB-19-03-7.5*, and *SB-19-103-6.5*.

e. Data quality or usability affected?

• Yes • No Comments:

We cannot assess if naphthalene was present in samples *SB-19-03-6.5*, *SB-19-03-7.5*, and *SB-19-103-6.5*. at concentrations below the laboratory detection limit (DL). The affected results are noted on the analytical results table.

6. <u>QC Samples</u>

- a. Method Blank
 - i. One method blank reported per matrix, analysis and 20 samples?

• Yes • No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

• Yes • No Comments:

Yes, however DRO were detected in method blank 1522739 at concentrations below the LOQ. The method blank was analyzed in the same analytical batch as project samples *SB-19-01-7.5* and *SB-19-01-5*.

iii. If above LOQ, what samples are affected?

Comments:

DRO were detected in project sample *SB-19-01-7.5* at concentrations greater than ten times the method blank detection, and sample results were unaffected.

DRO were detected in project sample SB-19-01-5 at concentrations less than the LOQ. We consider the DRO sample result not-detected at the LOQ due to the method blank detection and have flagged the result B* in the analytical results table.

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

• Yes • No Comments:

The DRO result for sample *SB-19-01-5* is considered not-detected at the LOQ and has been flagged B*.

v. Data quality or usability affected?

Comments:

The DRO result for sample *SB-19-01-5* is considered not-detected at the LOQ and has been flagged B*.

- b. Laboratory Control Sample/Duplicate (LCS/LCSD)
 - i. Organics One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

🔿 Yes 🛛 💿 No

Comments:

LCS/LCSD were reported for the GRO and DRO analyses. An LCS and MS/MSD were reported for the PAH and BTEX/naphthalene analyses.

- ii. Metals/Inorganics one LCS and one sample duplicate reported per matrix, analysis and 20 samples?
- © Yes ⊙ No Comments:

Metal/inorganic analyses were not requested with this work order.

 iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

• Yes • No Comments:

 iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

• Yes • No Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

There were no recovery or RPD failures in the LCS/LCSDs or MS/MSDs.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

○ Yes ⊙ No Comments:

N/A; see above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and/or usability were not affected; see above.

- c. Surrogates Organics Only
 - i. Are surrogate recoveries reported for organic analyses field, QC and laboratory samples?

• Yes • No Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

GRO surrogate 4-bromofluorobenzene was detected above laboratory limits in samples *SB19-01-7.5*, *SB19-03-6.5*, *SB19-103-6.5*, and *SB19-03-7.5* due to matrix interference.

- iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?
- Yes O No Comments:

GRO were detected in samples *SB19-01-7.5*, *SB19-03-6.5*, *SB19-103-6.5*, and *SB19-03-7.5* above the LOQ. Results are considered estimated, biased high, and have been flagged JH* in the analytical data table.

iv. Data quality or usability affected?

Comments:

GRO results for samples *SB19-01-7.5*, *SB19-03-6.5*, *SB19-103-6.5*, and *SB19-03-7.5* are considered estimated, biased high, and have been flagged JH* in the analytical data table.

- d. Trip blank Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil
 - i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples?

(If not, enter explanation below.)

 ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

○ Yes ● No Comments:

However, all samples were submitted in a single cooler with the trip blank present.

iii. All results less than LOQ?

• Yes • No Comments:

iv. If above LOQ, what samples are affected?

Comments:

N/A; there were no detections in the trip blank.

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

- e. Field Duplicate
 - i. One field duplicate submitted per matrix, analysis and 10 project samples?

○ Yes ⊙ No Comments:

A field duplicate was not submitted for the PAH or DRO analyses. See LCS/LCSD and MS/MSD data for assessment of precision for these analyses.

ii. Submitted blind to lab?

• Yes • No Comments:

The sample SB-19-103-6.5 is a field-duplicate of sample SB-19-03-6.5.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil) RPD (%) = Absolute value of: $\frac{(R_1-R_2)}{((R_1+R_2)/2)} \times 100$

> Where R_1 = Sample Concentration R_2 = Field Duplicate Concentration

Yes O No

Comments:

The relative precision demonstrated between the detected results of the field-duplicate samples was within the recommended DQO of 50%.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

No; see above.

f. Decontamination or Equipment Blank (If not applicable, a comment stating why must be entered below).

○ Yes ○ No ○ Not Applicable

N/A; samples were not collected with reusable equipment.

i. All results less than LOQ?

© Yes [●] No Comments:

N/A; samples were not collected with reusable equipment.

ii. If above LOQ, what samples are affected?

Comments:

N/A; samples were not collected with reusable equipment.

iii. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

- 7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)
 - a. Defined and appropriate?

○ Yes ● No Comments:

Additional data flags or qualifiers are not required.


Laboratory Report of Analysis

To: Shannon & Wilson-Fairbanks 2355 Hill Road Fairbanks, AK 99709 (907)749-0600

Report Number: 1199616

Client Project: 101752 Petro Star NPR

Dear Andrew Frick,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of ten years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of fourteen (14) days from the date of this report unless other archiving requirements were included in the quote.

If there are any questions about the report or services performed during this project, please call Jennifer at (907) 562-2343. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely, SGS North America Inc.

Stephen C. Ede 2019.08.22 09:56:34 -08'00'

Alaska Division Technical Director

Jennifer Dawkins Project Manager Jennifer.Dawkins@sgs.com Date

Print Date: 08/22/2019 8:43:52AM

SGS North America Inc.

200 West Potter Drive, Anchorage, AK 99518 t 907.562.2343 f 907.561.5301 www.us.sgs.com Results via Engage



Case Narrative

SGS Client: Shannon & Wilson-Fairbanks SGS Project: 1199616 Project Name/Site: 101752 Petro Star NPR Project Contact: Andrew Frick

Refer to sample receipt form for information on sample condition.

*QC comments may be associated with the field samples found in this report. When applicable, comments will be applied to associated field samples.

Print Date: 08/22/2019 8:43:52AM

SGS North America Inc.

200 West Potter Drive, Anchorage, AK 99518 t 907.562.2343 f 907.561.5301 www.us.sgs.com



Laboratory Qualifiers

Enclosed are the analytical results associated with the above work order. The results apply to the samples as received. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. This document is issued by the Company under its General Conditions of Service accessible at <<u>http://www.sgs.com/en/Terms-and-Conditions.aspx></u>. Attention is drawn to the limitation of liability, indenmification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the context or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & 17-021 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8015C, 8021B, 8082A, 8260C, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). SGS is only certified for the analytes listed on our Drinking Water Certification, and only those analytes will be reported to the State of Alaska for compliance. Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
В	Indicates the analyte is found in a blank associated with the sample.
CCV/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing Continuing Calibration Verification
CL	Control Limit
DF	Analytical Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LLQC/LLIQC	Low Level Quantitation Check
LOD	Limit of Detection (i.e., 1/2 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.
Sample summaries which i All DRO/RRO analyses are	nclude a result for "Total Solids" have already been adjusted for moisture content. i integrated per SOP.

Print Date: 08/22/2019 8:43:54AM

Note:



	Sa	ample Summary		
Client Sample ID	Lab Sample ID	Collected	Received	<u>Matrix</u>
MW19-01	1199616001	08/07/2019	08/09/2019	Water (Surface, Eff., Ground)
MW19-101	1199616002	08/07/2019	08/09/2019	Water (Surface, Eff., Ground)
EB19-01	1199616003	08/07/2019	08/09/2019	Water (Surface, Eff., Ground)
MW15-4	1199616004	08/07/2019	08/09/2019	Water (Surface, Eff., Ground)
MW19-04	1199616005	08/07/2019	08/09/2019	Water (Surface, Eff., Ground)
MW19-03	1199616006	08/07/2019	08/09/2019	Water (Surface, Eff., Ground)
MW19-103	1199616007	08/07/2019	08/09/2019	Water (Surface, Eff., Ground)
MW15-2	1199616008	08/07/2019	08/09/2019	Water (Surface, Eff., Ground)
MW10-03	1199616009	08/07/2019	08/09/2019	Water (Surface, Eff., Ground)
MW15-3	1199616010	08/07/2019	08/09/2019	Water (Surface, Eff., Ground)
MW19-02	1199616011	08/07/2019	08/09/2019	Water (Surface, Eff., Ground)
MW15-1	1199616012	08/07/2019	08/09/2019	Water (Surface, Eff., Ground)
Trip Blank	1199616013	08/07/2019	08/09/2019	Water (Surface, Eff., Ground)
Method	Method Desc	ription		

8270D SIM LV (PAH)8270 PAH SIM GC/MS Liq/Liq ext. LVSW8260CBTEX 8260 w/Naphthalene (W)AK102DRO Low Volume (W)AK101Gasoline Range Organics (W)SW8260CVolatile Organic Compounds (W)

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Detectable Results Summary

Client Sample ID: MW19-01			
Lab Sample ID: 1199616001	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	29.2	ug/L
	2-Methylnaphthalene	26.5	ug/L
	Acenaphthene	0.297	ug/L
	Fluorene	1.15	ug/L
	Naphthalene	24.6	ug/L
	Phenanthrene	0.385	ug/L
Semivolatile Organic Fuels	Diesel Range Organics	1.16	mg/L
Volatile Fuels	Gasoline Range Organics	1.13	mg/L
Volatile GC/MS	Benzene	3.13	ug/L
	Ethylbenzene	31.4	ug/L
	o-Xylene	52.1	ug/L
	P & M -Xylene	87.3	ug/L
	Toluene	189	ug/L
	Xylenes (total)	139	ug/L
Client Sample ID: MW19-101			
Lab Sample ID: 1199616002	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	25.1	ug/L
	2-Methylnaphthalene	23.1	ug/L
	Acenaphthene	0.268	ug/L
	Acenaphthylene	0.127	ug/L
	Fluorene	1.05	ug/L
	Naphthalene	21.2	ug/L
	Phenanthrene	0.351	ug/L
Semivolatile Organic Fuels	Diesel Range Organics	2.88	mg/L
Volatile Fuels	Gasoline Range Organics	1.20	mg/L
Volatile GC/MS	Benzene	3.11	ug/L
	Ethylbenzene	31.0	ug/L
	o-Xylene	51.8	ug/L
	P & M -Xylene	85.9	ug/L
	Toluene	194	ug/L
	Xylenes (total)	138	ug/L

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Detectable Results Summary

Client Sample ID: EB19-01			
Lab Sample ID: 1199616003	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	0.0395J	ug/L
	2-Methylnaphthalene	0.0483	ug/L
	Naphthalene	0.0376J	ug/L
Volatile Fuels	Gasoline Range Organics	0.0781J	mg/L
Volatile GC/MS	Benzene	0.950	ug/L
	Ethylbenzene	1.31	ug/L
	Naphthalene	1.33	ug/L
	o-Xylene	1.28	ug/L
	P & M -Xylene	1.40J	ug/L
	Toluene	25.8	ug/L
	Xylenes (total)	2.68J	ug/L
Client Sample ID: MW15-4			
Lab Sample ID: 1199616004	Parameter	Popult	Linite
Volatilo Euolo	Gasoline Range Organics	0.0613.1	ma/l
Volatile Fuels	Benzene	0.210.1	ug/L
Volatile GC/MS	Ethylbenzene	0.660.1	ug/L
	o-Xvlene	1 04	ug/L
	P & M -Xvlene	2 17	ug/L
	Toluene	13.0	ug/L
	Xylenes (total)	3.21	ug/L
Olivert Operate ID: MM40.04			- 5
Lab Sample ID: 1199616005	Parameter	<u>Result</u>	<u>Units</u>
Volatile GC/MS	loluene	0.360J	ug/L
Client Sample ID: MW19-03			
Lab Sample ID: 1199616006	Parameter	<u>Result</u>	<u>Units</u>
Volatile Fuels	Gasoline Range Organics	224	mg/L
Volatile GC/MS	Benzene	1260	ug/L
	Ethylbenzene	4760	ug/L
	Naphthalene	66.0J	ug/L
	o-Xylene	6970	ug/L
	P & M -Xylene	15300	ug/L
	Toluene	78800	ug/L
	Xylenes (total)	22300	ug/L
Client Sample ID: MW19-103			
Lab Sample ID: 1199616007	Parameter	Result	Units
Volatile Fuels	Gasoline Range Organics	222	ma/L
Volatile GC/MS	Benzene	1300	ua/L
	Ethylbenzene	5000	ug/L
	o-Xvlene	7270	ua/L
	P & M -Xylene	16000	ug/L
	Toluene	82100	ug/L
	Xvlenes (total)	23200	ug/L
	,,		- 0

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Detectable Results Summary

Client Sample ID: MW15-2			
Lab Sample ID: 1199616008	Parameter	Result	<u>Units</u>
Volatile Fuels	Gasoline Range Organics	0.0332J	mg/L
Volatile GC/MS	Toluene	0.541J	ug/L
Client Sample ID: MW15-3			
Lab Sample ID: 1199616010	Parameter	Result	<u>Units</u>
Volatile GC/MS	Toluene	0.410J	ug/L

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Results of MW19-01

Client Sample ID: **MW19-01** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199616001 Lab Project ID: 1199616 Collection Date: 08/07/19 14:22 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Polynuclear Aromatics GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Limits</u>	Date Analyzed
1-Methylnaphthalene	29.2	0.236	0.0708	ug/L	5		08/17/19 01:09
2-Methylnaphthalene	26.5	0.236	0.0708	ug/L	5		08/17/19 01:09
Acenaphthene	0.297	0.0472	0.0142	ug/L	1		08/15/19 21:08
Acenaphthylene	0.0236 U	0.0472	0.0142	ug/L	1		08/15/19 21:08
Anthracene	0.0236 U	0.0472	0.0142	ug/L	1		08/15/19 21:08
Benzo(a)Anthracene	0.0236 U	0.0472	0.0142	ug/L	1		08/15/19 21:08
Benzo[a]pyrene	0.00945 U	0.0189	0.00585	ug/L	1		08/15/19 21:08
Benzo[b]Fluoranthene	0.0236 U	0.0472	0.0142	ug/L	1		08/15/19 21:08
Benzo[g,h,i]perylene	0.0236 U	0.0472	0.0142	ug/L	1		08/15/19 21:08
Benzo[k]fluoranthene	0.0236 U	0.0472	0.0142	ug/L	1		08/15/19 21:08
Chrysene	0.0236 U	0.0472	0.0142	ug/L	1		08/15/19 21:08
Dibenzo[a,h]anthracene	0.00945 U	0.0189	0.00585	ug/L	1		08/15/19 21:08
Fluoranthene	0.0236 U	0.0472	0.0142	ug/L	1		08/15/19 21:08
Fluorene	1.15	0.0472	0.0142	ug/L	1		08/15/19 21:08
Indeno[1,2,3-c,d] pyrene	0.0236 U	0.0472	0.0142	ug/L	1		08/15/19 21:08
Naphthalene	24.6	0.472	0.146	ug/L	5		08/17/19 01:09
Phenanthrene	0.385	0.0472	0.0142	ug/L	1		08/15/19 21:08
Pyrene	0.0236 U	0.0472	0.0142	ug/L	1		08/15/19 21:08
Surrogates							
2-Methylnaphthalene-d10 (surr)	69.1	47-106		%	1		08/15/19 21:08
Fluoranthene-d10 (surr)	58.1	24-116		%	1		08/15/19 21:08

Batch Information

Analytical Batch: XMS11641 Analytical Method: 8270D SIM LV (PAH) Analyst: DSD Analytical Date/Time: 08/17/19 01:09 Container ID: 1199616001-K

Analytical Batch: XMS11637 Analytical Method: 8270D SIM LV (PAH) Analyst: DSD Analytical Date/Time: 08/15/19 21:08 Container ID: 1199616001-K Prep Batch: XXX42004 Prep Method: SW3520C Prep Date/Time: 08/14/19 08:35 Prep Initial Wt./Vol.: 265 mL Prep Extract Vol: 1 mL

Prep Batch: XXX42004 Prep Method: SW3520C Prep Date/Time: 08/14/19 08:35 Prep Initial Wt./Vol.: 265 mL Prep Extract Vol: 1 mL

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Results of MW19-01							
Client Sample ID: MW19-01 Client Project ID: 101752 Petro Star NPR Lab Sample ID: 1199616001 Lab Project ID: 1199616		Collection Received Matrix: W Solids (% Location:		ellection Date: 08/07/19 14:22 eceived Date: 08/09/19 09:51 atrix: Water (Surface, Eff., Grou lids (%): cation:			
Results by Semivolatile Organic Fuels	5					Allowable	
Parameter	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	<u>DF</u>	Limits	Date Analyzed
Diesel Range Organics	1.16	0.547	0.164	mg/L	1		08/19/19 15:0
Surrogates							
5a Androstane (surr)	72.1	50-150		%	1		08/19/19 15:0
Batch Information							
Analytical Batch: XFC15254			Prep Batch:	XXX42035			
Analytical Method: AK102			Prep Method	: SW35200)		
Analytical Date/Time: 08/19/19 15:05			Prep Date/11 Prep Initial W	/t./Vol.: 274	mL		
Container ID: 1199616001-G			Prep Extract	Vol: 1 mL			

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Results of MW19-01							
Client Sample ID: MW19-01 Client Project ID: 101752 Petro Star NPR Lab Sample ID: 1199616001 Lab Project ID: 1199616		C R M S La	Collection Date: 08/07/19 14:22 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:				
Results by Volatile Fuels			_				
<u>Parameter</u> Gasoline Range Organics	<u>Result Qual</u> 1.13	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> <u>Limits</u>	Date Analyze 08/17/19 01:3
urrogates							
4-Bromofluorobenzene (surr)	143	50-150		%	1		08/17/19 01:3
Batch Information							
Analytical Batch: VFC14881 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/17/19 01:34 Container ID: 1199616001-D		F F F	Prep Batch: Prep Method: Prep Date/Tir Prep Initial W Prep Extract	VXX34664 : SW5030B me: 08/16/1 't./Vol.: 5 m Vol: 5 mL	3 19 06:00 IL		

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Results of MW19-01

Client Sample ID: **MW19-01** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199616001 Lab Project ID: 1199616

Collection Date: 08/07/19 14:22 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

					Allowable	
Result Qual	LOQ/CL	DL	<u>Units</u>	DF	<u>Limits</u>	Date Analyzed
3.13	0.400	0.120	ug/L	1		08/14/19 16:58
31.4	1.00	0.310	ug/L	1		08/14/19 16:58
52.1	1.00	0.310	ug/L	1		08/14/19 16:58
87.3	2.00	0.620	ug/L	1		08/14/19 16:58
189	5.00	1.55	ug/L	5		08/16/19 17:52
139	3.00	1.00	ug/L	1		08/14/19 16:58
110	81-118		%	1		08/14/19 16:58
105	85-114		%	1		08/14/19 16:58
94.8	89-112		%	1		08/14/19 16:58
	Result Qual 3.13 31.4 52.1 87.3 189 139 110 105 94.8	Result QualLOQ/CL3.130.40031.41.0052.11.0087.32.001895.001393.0011081-11810585-11494.889-112	Result QualLOQ/CLDL3.130.4000.12031.41.000.31052.11.000.31087.32.000.6201895.001.551393.001.0011081-11810585-11494.889-112	Result Qual LOQ/CL DL Units 3.13 0.400 0.120 ug/L 31.4 1.00 0.310 ug/L 52.1 1.00 0.310 ug/L 87.3 2.00 0.620 ug/L 189 5.00 1.55 ug/L 139 3.00 1.00 ug/L 110 81-118 % 105 85-114 % 94.8 89-112 %	Result Qual LOQ/CL DL Units DF 3.13 0.400 0.120 ug/L 1 31.4 1.00 0.310 ug/L 1 52.1 1.00 0.310 ug/L 1 87.3 2.00 0.620 ug/L 1 189 5.00 1.55 ug/L 5 139 3.00 1.00 ug/L 1 105 85-114 % 1 94.8 89-112 % 1	Result Qual LOQ/CL DL Units DF Limits 3.13 0.400 0.120 ug/L 1 31.4 1.00 0.310 ug/L 1 52.1 1.00 0.310 ug/L 1 87.3 2.00 0.620 ug/L 1 189 5.00 1.55 ug/L 5 139 3.00 1.00 ug/L 1 110 81-118 % 1 94.8 89-112 % 1

Batch Information

Analytical Batch: VMS19308 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/14/19 16:58 Container ID: 1199616001-A

Analytical Batch: VMS19324 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/16/19 17:52 Container ID: 1199616001-A Prep Batch: VXX34653 Prep Method: SW5030B Prep Date/Time: 08/14/19 11:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Prep Batch: VXX34674 Prep Method: SW5030B Prep Date/Time: 08/16/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

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Results of MW19-101

Client Sample ID: **MW19-101** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199616002 Lab Project ID: 1199616 Collection Date: 08/07/19 14:12 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Polynuclear Aromatics GC/MS

						Allowable	
<u>Parameter</u>	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	DF	Limits	Date Analyzed
1-Methylnaphthalene	25.1	0.240	0.0721	ug/L	5		08/17/19 01:30
2-Methylnaphthalene	23.1	0.240	0.0721	ug/L	5		08/17/19 01:30
Acenaphthene	0.268	0.0481	0.0144	ug/L	1		08/15/19 21:28
Acenaphthylene	0.127	0.0481	0.0144	ug/L	1		08/15/19 21:28
Anthracene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:28
Benzo(a)Anthracene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:28
Benzo[a]pyrene	0.00960 U	0.0192	0.00596	ug/L	1		08/15/19 21:28
Benzo[b]Fluoranthene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:28
Benzo[g,h,i]perylene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:28
Benzo[k]fluoranthene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:28
Chrysene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:28
Dibenzo[a,h]anthracene	0.00960 U	0.0192	0.00596	ug/L	1		08/15/19 21:28
Fluoranthene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:28
Fluorene	1.05	0.0481	0.0144	ug/L	1		08/15/19 21:28
Indeno[1,2,3-c,d] pyrene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:28
Naphthalene	21.2	0.481	0.149	ug/L	5		08/17/19 01:30
Phenanthrene	0.351	0.0481	0.0144	ug/L	1		08/15/19 21:28
Pyrene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:28
Surrogates							
2-Methylnaphthalene-d10 (surr)	61.1	47-106		%	1		08/15/19 21:28
Fluoranthene-d10 (surr)	50.5	24-116		%	1		08/15/19 21:28

Batch Information

Analytical Batch: XMS11641 Analytical Method: 8270D SIM LV (PAH) Analyst: DSD Analytical Date/Time: 08/17/19 01:30 Container ID: 1199616002-K

Analytical Batch: XMS11637 Analytical Method: 8270D SIM LV (PAH) Analyst: DSD Analytical Date/Time: 08/15/19 21:28 Container ID: 1199616002-K Prep Batch: XXX42004 Prep Method: SW3520C Prep Date/Time: 08/14/19 08:35 Prep Initial Wt./Vol.: 260 mL Prep Extract Vol: 1 mL

Prep Batch: XXX42004 Prep Method: SW3520C Prep Date/Time: 08/14/19 08:35 Prep Initial Wt./Vol.: 260 mL Prep Extract Vol: 1 mL

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Results of MW19-101							
Client Sample ID: MW19-101 Client Project ID: 101752 Petro Star NPR Lab Sample ID: 1199616002 Lab Project ID: 1199616		C F M S L	Collection Da Received Da Matrix: Wate Solids (%): ocation:	llection Date: 08/07/19 14:12 ceived Date: 08/09/19 09:51 trix: Water (Surface, Eff., Ground) ids (%): cation:			
Results by Semivolatile Organic Fuels	3		_				
Parameter	Result Qual	LOQ/CL	DL	Units	DF	<u>Allowable</u> Limits	Date Analvze
Diesel Range Organics	2.88	0.547	0.164	mg/L	1		08/19/19 15:
urrogates							
5a Androstane (surr)	78.3	50-150		%	1		08/19/19 15:
Batch Information							
Analytical Batch: XFC15254			Prep Batch:	XXX42035			
Analytical Method: AK102		Prep Method: SW3520C					
Analytical Date/Time: 08/19/19 15:15		Prep Date/Time: 08/17/19 09:56 Prep Initial Wt /Vol : 274 ml					
Container ID: 1199616002-G			Prep Extract	Vol: 1 mL			

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Results of MW19-101							
Client Sample ID: MW19-101 Client Project ID: 101752 Petro Star N Lab Sample ID: 1199616002 Lab Project ID: 1199616	Collection Date: 08/07/19 14:12 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:						
Results by Volatile Fuels							
<u>Parameter</u> Gasoline Range Organics	<u>Result Qual</u> 1.20	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> <u>Limits</u>	<u>Date Analyze</u> 08/17/19 01:5
urrogates							
4-Bromofluorobenzene (surr)	145	50-150		%	1		08/17/19 01:5
Batch Information							
Analytical Batch: VFC14881 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/17/19 01:52 Container ID: 1199616002-D			Prep Batch: Prep Method Prep Date/Tir Prep Initial W Prep Extract	VXX34664 : SW5030E me: 08/16/ /t./Vol.: 5 m Vol: 5 mL	3 19 06:00 IL		

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Results of MW19-101

Client Sample ID: MW19-101
Client Project ID: 101752 Petro Star NPR
Lab Sample ID: 1199616002
Lab Project ID: 1199616

Collection Date: 08/07/19 14:12 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	DF	Limits	Date Analyzed
Benzene	3.11	0.400	0.120	ug/L	1		08/14/19 17:13
Ethylbenzene	31.0	1.00	0.310	ug/L	1		08/14/19 17:13
o-Xylene	51.8	1.00	0.310	ug/L	1		08/14/19 17:13
P & M -Xylene	85.9	2.00	0.620	ug/L	1		08/14/19 17:13
Toluene	194	1.00	0.310	ug/L	1		08/14/19 17:13
Xylenes (total)	138	3.00	1.00	ug/L	1		08/14/19 17:13
Surrogates							
1,2-Dichloroethane-D4 (surr)	109	81-118		%	1		08/14/19 17:13
4-Bromofluorobenzene (surr)	106	85-114		%	1		08/14/19 17:13
Toluene-d8 (surr)	95.9	89-112		%	1		08/14/19 17:13

Batch Information

Analytical Batch: VMS19308 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/14/19 17:13 Container ID: 1199616002-A Prep Batch: VXX34653 Prep Method: SW5030B Prep Date/Time: 08/14/19 11:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:43:56AM

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Results of EB19-01

Client Sample ID: EB19-01
Client Project ID: 101752 Petro Star NPR
Lab Sample ID: 1199616003
Lab Project ID: 1199616

Collection Date: 08/07/19 16:15 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Polynuclear Aromatics GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	<u>DF</u>	Limits	Date Analyzed
1-Methylnaphthalene	0.0395 J	0.0481	0.0144	ug/L	1		08/15/19 21:49
2-Methylnaphthalene	0.0483	0.0481	0.0144	ug/L	1		08/15/19 21:49
Acenaphthene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:49
Acenaphthylene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:49
Anthracene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:49
Benzo(a)Anthracene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:49
Benzo[a]pyrene	0.00960 U	0.0192	0.00596	ug/L	1		08/15/19 21:49
Benzo[b]Fluoranthene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:49
Benzo[g,h,i]perylene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:49
Benzo[k]fluoranthene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:49
Chrysene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:49
Dibenzo[a,h]anthracene	0.00960 U	0.0192	0.00596	ug/L	1		08/15/19 21:49
Fluoranthene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:49
Fluorene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:49
Indeno[1,2,3-c,d] pyrene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:49
Naphthalene	0.0376 J	0.0962	0.0298	ug/L	1		08/15/19 21:49
Phenanthrene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:49
Pyrene	0.0240 U	0.0481	0.0144	ug/L	1		08/15/19 21:49
Surrogates							
2-Methylnaphthalene-d10 (surr)	47.7	47-106		%	1		08/15/19 21:49
Fluoranthene-d10 (surr)	48	24-116		%	1		08/15/19 21:49

Batch Information

Analytical Batch: XMS11637 Analytical Method: 8270D SIM LV (PAH) Analyst: DSD Analytical Date/Time: 08/15/19 21:49 Container ID: 1199616003-K Prep Batch: XXX42004 Prep Method: SW3520C Prep Date/Time: 08/14/19 08:35 Prep Initial Wt./Vol.: 260 mL Prep Extract Vol: 1 mL

Print Date: 08/22/2019 8:43:56AM

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Results of EB19-01							
Client Sample ID: EB19-01 Client Project ID: 101752 Petro Star NPR Lab Sample ID: 1199616003 Lab Project ID: 1199616		Collection Date: 08/07/19 16:15 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:					
Results by Semivolatile Organic Fuels	5		_				
<u>Parameter</u> Diesel Range Organics	<u>Result Qual</u> 0.283 U	<u>LOQ/CL</u> 0.566	<u>DL</u> 0.170	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> <u>Limits</u>	<u>Date Analyzec</u> 08/20/19 08:44
Surrogates							
5a Androstane (surr)	82.6	50-150		%	1		08/20/19 08:44
Batch Information							
Analytical Batch: XFC15255 Analytical Method: AK102 Analyst: CMS Analytical Date/Time: 08/20/19 08:44 Container ID: 1199616003-G		Prep Batch: XXX42040 Prep Method: SW3520C Prep Date/Time: 08/19/19 09:00 Prep Initial Wt./Vol.: 265 mL Prep Extract Vol: 1 mL					

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Client Sample ID: EB19-01 Client Project ID: 101752 Petro Star N Lab Sample ID: 1199616003 Lab Project ID: 1199616	C R M S L						
Results by Volatile Fuels <u>Parameter</u> Gasoline Range Organics	<u>Result Qual</u> 0.0781 J	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> <u>Limits</u>	Date Analyzed 08/17/19 02:10
urrogates 4-Bromofluorobenzene (surr)	88.8	50-150		%	1		08/17/19 02:10
Batch Information Analytical Batch: VFC14881 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/17/19 02:10 Container ID: 1199616003-D		1	Prep Batch: \ Prep Method: Prep Date/Tir Prep Initial W Prep Extract \	VXX34664 SW5030B ne: 08/16/1 t./Vol.: 5 m Vol: 5 mL	9 06:00 L		

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Results of EB19-01

Client Sample ID: EB19-01
Client Project ID: 101752 Petro Star NPR
Lab Sample ID: 1199616003
Lab Project ID: 1199616

Collection Date: 08/07/19 16:15 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	Limits	Date Analyzed
Benzene	0.950	0.400	0.120	ug/L	1		08/14/19 17:29
Ethylbenzene	1.31	1.00	0.310	ug/L	1		08/14/19 17:29
Naphthalene	1.33	1.00	0.310	ug/L	1		08/14/19 17:29
o-Xylene	1.28	1.00	0.310	ug/L	1		08/14/19 17:29
P & M -Xylene	1.40 J	2.00	0.620	ug/L	1		08/14/19 17:29
Toluene	25.8	1.00	0.310	ug/L	1		08/14/19 17:29
Xylenes (total)	2.68 J	3.00	1.00	ug/L	1		08/14/19 17:29
Surrogates							
1,2-Dichloroethane-D4 (surr)	111	81-118		%	1		08/14/19 17:29
4-Bromofluorobenzene (surr)	101	85-114		%	1		08/14/19 17:29
Toluene-d8 (surr)	93.3	89-112		%	1		08/14/19 17:29

Batch Information

Analytical Batch: VMS19308 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/14/19 17:29 Container ID: 1199616003-A Prep Batch: VXX34653 Prep Method: SW5030B Prep Date/Time: 08/14/19 11:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:43:56AM

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Client Sample ID: MW15-4 Client Project ID: 101752 Petro Star NPR Lab Sample ID: 1199616004 Lab Project ID: 1199616		C R M S					
Results by Volatile Fuels Parameter Gasoline Range Organics	<u>Result Qual</u> 0.0613 J	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> <u>Limits</u>	Date Analyzed 08/17/19 02:27
u rrogates 4-Bromofluorobenzene (surr)	89.8	50-150		%	1		08/17/19 02:27
Batch Information Analytical Batch: VFC14881 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/17/19 02:27 Container ID: 1199616004-D	7		Prep Batch: ^ Prep Method: Prep Date/Tir Prep Initial W Prep Extract ^	VXX34664 SW5030E ne: 08/16/1 't./Vol.: 5 m Vol: 5 mL	3 19 06:00 IL		

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Results of MW15-4

SG:

Client Sample ID: MW15-4
Client Project ID: 101752 Petro Star NPR
Lab Sample ID: 1199616004
Lab Project ID: 1199616

Collection Date: 08/07/19 12:53 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
<u>Parameter</u>	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	<u>Limits</u>	Date Analyzed
Benzene	0.210 J	0.400	0.120	ug/L	1		08/14/19 17:44
Ethylbenzene	0.660 J	1.00	0.310	ug/L	1		08/14/19 17:44
Naphthalene	0.500 U	1.00	0.310	ug/L	1		08/14/19 17:44
o-Xylene	1.04	1.00	0.310	ug/L	1		08/14/19 17:44
P & M -Xylene	2.17	2.00	0.620	ug/L	1		08/14/19 17:44
Toluene	13.0	1.00	0.310	ug/L	1		08/14/19 17:44
Xylenes (total)	3.21	3.00	1.00	ug/L	1		08/14/19 17:44
Surrogates							
1,2-Dichloroethane-D4 (surr)	112	81-118		%	1		08/14/19 17:44
4-Bromofluorobenzene (surr)	102	85-114		%	1		08/14/19 17:44
Toluene-d8 (surr)	92.1	89-112		%	1		08/14/19 17:44

Batch Information

Analytical Batch: VMS19308 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/14/19 17:44 Container ID: 1199616004-A Prep Batch: VXX34653 Prep Method: SW5030B Prep Date/Time: 08/14/19 11:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:43:56AM

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Results of MW19-04							
Client Sample ID: MW19-04 Client Project ID: 101752 Petro Star N .ab Sample ID: 1199616005 .ab Project ID: 1199616	C R M S						
Results by Volatile Fuels							
Parameter Gasoline Range Organics	<u>Result Qual</u> 0.0500 U	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> <u>Limits</u>	<u>Date Analyzed</u> 08/17/19 02:4
irrogates							
-Bromofluorobenzene (surr)	90.6	50-150		%	1		08/17/19 02:4
Batch Information							
Analytical Batch: VFC14881 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/17/19 02:45 Container ID: 1199616005-D			Prep Batch: \ Prep Method: Prep Date/Tir Prep Initial W Prep Extract \	VXX34664 SW5030B ne: 08/16/1 t./Vol.: 5 m Vol: 5 mL	8 19 06:00 L		

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Results of MW19-04

SG:

Client Sample ID: MW19-04
Client Project ID: 101752 Petro Star NPR
Lab Sample ID: 1199616005
Lab Project ID: 1199616

Collection Date: 08/07/19 11:08 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter_	<u>Result Qual</u>	LOQ/CL	DL	<u>Units</u>	DF	Limits	Date Analyzed
Benzene	0.200 U	0.400	0.120	ug/L	1		08/14/19 17:59
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/14/19 17:59
Naphthalene	0.500 U	1.00	0.310	ug/L	1		08/14/19 17:59
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/14/19 17:59
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/14/19 17:59
Toluene	0.360 J	1.00	0.310	ug/L	1		08/14/19 17:59
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/14/19 17:59
Surrogates							
1,2-Dichloroethane-D4 (surr)	112	81-118		%	1		08/14/19 17:59
4-Bromofluorobenzene (surr)	102	85-114		%	1		08/14/19 17:59
Toluene-d8 (surr)	92.7	89-112		%	1		08/14/19 17:59

Batch Information

Analytical Batch: VMS19308 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/14/19 17:59 Container ID: 1199616005-A Prep Batch: VXX34653 Prep Method: SW5030B Prep Date/Time: 08/14/19 11:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:43:56AM

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Results of MW19-03							
Client Sample ID: MW19-03 Client Project ID: 101752 Petro Star N Lab Sample ID: 1199616006 Lab Project ID: 1199616	PR	C R M S L					
Results by Volatile Fuels							
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	Allowable Limits	Date Analyze
Gasoline Range Organics	224	50.0	15.5	mg/L	500		08/20/19 03:1
Surrogates							
4-Bromofluorobenzene (surr)	85.4	50-150		%	500		08/20/19 03:1
Batch Information							
Analytical Batch: VFC14884			Prep Batch:	VXX34681			
Analytical Method: AK101			Prep Methor Prep Date/T	d: SW5030E	0.06.00		
Analytical Date/Time: 08/20/19 03:13			Prep Initial V	Vt./Vol.: 5 m	L 00.00		
Container ID: 1199616006-B			Prep Extract	Vol: 5 mL			

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Results of MW19-03

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Client Sample ID: **MW19-03** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199616006 Lab Project ID: 1199616

Collection Date: 08/07/19 12:03 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable		
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	Limits	Date Analyzed	
Benzene	1260	400	120	ug/L	1000		08/19/19 19:36	
Ethylbenzene	4760	1000	310	ug/L	1000		08/19/19 19:36	
Naphthalene	66.0 J	200	62.0	ug/L	200		08/16/19 18:07	
o-Xylene	6970	1000	310	ug/L	1000		08/19/19 19:36	
P & M -Xylene	15300	2000	620	ug/L	1000		08/19/19 19:36	
Toluene	78800	1000	310	ug/L	1000		08/19/19 19:36	
Xylenes (total)	22300	3000	1000	ug/L	1000		08/19/19 19:36	
Surrogates								
1,2-Dichloroethane-D4 (surr)	90.8	81-118		%	1000		08/19/19 19:36	
4-Bromofluorobenzene (surr)	95.6	85-114		%	1000		08/19/19 19:36	
Toluene-d8 (surr)	103	89-112		%	1000		08/19/19 19:36	

Batch Information

Analytical Batch: VMS19324 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/16/19 18:07 Container ID: 1199616006-E

Analytical Batch: VMS19323 Analytical Method: SW8260C Analyst: NRB Analytical Date/Time: 08/19/19 19:36 Container ID: 1199616006-E Prep Batch: VXX34674 Prep Method: SW5030B Prep Date/Time: 08/16/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Prep Batch: VXX34673 Prep Method: SW5030B Prep Date/Time: 08/19/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

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Results of MW19-103							
Client Sample ID: MW19-103 Client Project ID: 101752 Petro Star N Lab Sample ID: 1199616007 Lab Project ID: 1199616	C F M S L						
Results by Volatile Fuels			_				
<u>Parameter</u> Gasoline Range Organics	<u>Result Qual</u> 222	<u>LOQ/CL</u> 50.0	<u>DL</u> 15.5	<u>Units</u> mg/L	<u>DF</u> 500	<u>Allowable</u> Limits	<u>Date Analyzec</u> 08/20/19 03:48
Surrogates							
4-Bromofluorobenzene (surr)	83.2	50-150		%	500		08/20/19 03:48
Batch Information							
Analytical Batch: VFC14884 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/20/19 03:48			Prep Batch: Prep Methor Prep Date/T Prep Initial V Prep Extract	VXX34681 d: SW5030E ime: 08/19/ [,] Vt./Vol.: 5 m	8 19 06:00 IL		

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Results of MW19-103

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Client Sample ID: **MW19-103** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199616007 Lab Project ID: 1199616

Collection Date: 08/07/19 11:53 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	Limits	Date Analyzed
Benzene	1300	400	120	ug/L	1000		08/19/19 19:51
Ethylbenzene	5000	1000	310	ug/L	1000		08/19/19 19:51
Naphthalene	100 U	200	62.0	ug/L	200		08/16/19 19:09
o-Xylene	7270	1000	310	ug/L	1000		08/19/19 19:51
P & M -Xylene	16000	2000	620	ug/L	1000		08/19/19 19:51
Toluene	82100	1000	310	ug/L	1000		08/19/19 19:51
Xylenes (total)	23200	3000	1000	ug/L	1000		08/19/19 19:51
Surrogates							
1,2-Dichloroethane-D4 (surr)	89.4	81-118		%	1000		08/19/19 19:51
4-Bromofluorobenzene (surr)	96.7	85-114		%	1000		08/19/19 19:51
Toluene-d8 (surr)	103	89-112		%	1000		08/19/19 19:51

Batch Information

Analytical Batch: VMS19324 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/16/19 19:09 Container ID: 1199616007-E

Analytical Batch: VMS19323 Analytical Method: SW8260C Analyst: NRB Analytical Date/Time: 08/19/19 19:51 Container ID: 1199616007-E Prep Batch: VXX34674 Prep Method: SW5030B Prep Date/Time: 08/16/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Prep Batch: VXX34673 Prep Method: SW5030B Prep Date/Time: 08/19/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:43:56AM

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ent Sample ID: MW15-2 ent Project ID: 101752 Petro St b Sample ID: 1199616008 b Project ID: 1199616	ar NPR	C F M S L					
sults by Volatile Fuels						Allowable	
rameter	Result Qual	LOQ/CL	<u>DL</u>	<u>Units</u>	DF	Limits	Date Analyzed
soline Range Organics	0.0332 J	0.100	0.0310	mg/L	1		08/17/19 04:13
rogates Bromofluorobenzene (surr)	88.2	50-150		0/	1		08/17/10 0/11
Analytical Batch: VFC14881 Analytical Batch: VFC14881 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/17/19 04: Container ID: 1199616008-D	13		Prep Batch: Prep Method: Prep Date/Tir Prep Initial W Prep Extract ¹	VXX34664 : SW5030E me: 08/16/ 't./Vol.: 5 m Vol: 5 mL	3 19 06:00 IL		

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Results of MW15-2

SG

Client Sample ID: **MW15-2** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199616008 Lab Project ID: 1199616

Collection Date: 08/07/19 12:07 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	<u>Limits</u>	Date Analyzed
Benzene	0.200 U	0.400	0.120	ug/L	1		08/16/19 14:47
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/16/19 14:47
Naphthalene	0.500 U	1.00	0.310	ug/L	1		08/16/19 14:47
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/16/19 14:47
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/16/19 14:47
Toluene	0.541 J	1.00	0.310	ug/L	1		08/16/19 14:47
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/16/19 14:47
Surrogates							
1,2-Dichloroethane-D4 (surr)	110	81-118		%	1		08/14/19 18:46
4-Bromofluorobenzene (surr)	104	85-114		%	1		08/14/19 18:46
Toluene-d8 (surr)	93.5	89-112		%	1		08/14/19 18:46

Batch Information

Analytical Batch: VMS19324 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/16/19 14:47 Container ID: 1199616008-A

Analytical Batch: VMS19308 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/14/19 18:46 Container ID: 1199616008-A Prep Batch: VXX34674 Prep Method: SW5030B Prep Date/Time: 08/16/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Prep Batch: VXX34653 Prep Method: SW5030B Prep Date/Time: 08/14/19 11:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:43:56AM

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Client Sample ID: MW10-03 Client Sample ID: 101752 Petro Star N Lab Sample ID: 1199616009 Lab Project ID: 1199616	IPR	C R M S L					
Results by Semivolatile Organic Fuels	S						
<u>Parameter</u> Diesel Range Organics	<u>Result Qual</u> 0.283 U	<u>LOQ/CL</u> 0.566	<u>DL</u> 0.170	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> <u>Limits</u>	Date Analyzed 08/20/19 08:54
Surrogates							
5a Androstane (surr)	84.6	50-150		%	1		08/20/19 08:54
Batch Information							
Analytical Batch: XFC15255 Analytical Method: AK102 Analyst: CMS Analytical Date/Time: 08/20/19 08:54 Container ID: 1199616009-G		i i i i i i i i i i i i i i i i i i i	Prep Batch: Prep Method Prep Date/Ti Prep Initial W Prep Extract	XXX42040 I: SW3520C me: 08/19/ /t./Vol.: 265 Vol: 1 mL	C 19 09:00 5 mL		

J flagging is activated

Client Sample ID: MW10-03 Client Project ID: 101752 Petro Sta Lab Sample ID: 1199616009 Lab Project ID: 1199616	ar NPR	C R M Si La					
Results by Volatile Fuels <u>Parameter</u> Gasoline Range Organics	<u>Result Qual</u> 0.0500 U	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> Limits	<u>Date Analyze</u> 08/17/19 04:3
urrogates 4-Bromofluorobenzene (surr)	93	50-150		%	1		08/17/19 04:3
Batch Information Analytical Batch: VFC14881 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/17/19 04:3 Container ID: 1199616009-D	1	F F F F	Prep Batch: Prep Method: Prep Date/Tir Prep Initial W Prep Extract	VXX34664 SW5030E ne: 08/16/ t./Vol.: 5 m Vol: 5 mL	8 19 06:00 IL		

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Results of MW10-03

Client Sample ID: **MW10-03** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199616009 Lab Project ID: 1199616

Collection Date: 08/07/19 15:24 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
<u>Parameter</u>	<u>Result Qual</u>	LOQ/CL	DL	<u>Units</u>	DF	<u>Limits</u>	Date Analyzed
Benzene	0.200 U	0.400	0.120	ug/L	1		08/14/19 19:01
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/16/19 15:03
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/16/19 15:03
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/16/19 15:03
Toluene	0.500 U	1.00	0.310	ug/L	1		08/16/19 15:03
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/16/19 15:03
Surrogates							
1,2-Dichloroethane-D4 (surr)	112	81-118		%	1		08/14/19 19:01
4-Bromofluorobenzene (surr)	104	85-114		%	1		08/14/19 19:01
Toluene-d8 (surr)	94.4	89-112		%	1		08/14/19 19:01

Batch Information

Analytical Batch: VMS19324 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/16/19 15:03 Container ID: 1199616009-A

Analytical Batch: VMS19308 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/14/19 19:01 Container ID: 1199616009-A Prep Batch: VXX34674 Prep Method: SW5030B Prep Date/Time: 08/16/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Prep Batch: VXX34653 Prep Method: SW5030B Prep Date/Time: 08/14/19 11:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:43:56AM

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Results of MW15-3 Client Sample ID: MW15-3 Client Project ID: 101752 Petro Star N Lab Sample ID: 1199616010 Lab Project ID: 1199616	PR	C R M S L	collection Da teceived Dat latrix: Water colids (%): ocation:	te: 08/07/ te: 08/09/ [,] (Surface,	19 12:57 19 09:51 Eff., Gro	und)	
Results by Volatile Fuels Parameter Gasoline Range Organics	<u>Result Qual</u> 0.0500 U	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> Limits	Date Analyzed 08/17/19 04:49
urrogates 4-Bromofluorobenzene (surr)	89.1	50-150		%	1		08/17/19 04:49
Batch Information Analytical Batch: VFC14881 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/17/19 04:49 Container ID: 1199616010-D			Prep Batch: ^ Prep Method: Prep Date/Tir Prep Initial W Prep Extract ^	VXX34664 SW5030B ne: 08/16/1 t./Vol.: 5 m Vol: 5 mL	; 19 06:00 L		

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Results of MW15-3

SG

Client Sample ID: **MW15-3** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199616010 Lab Project ID: 1199616

Collection Date: 08/07/19 12:57 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
<u>Parameter</u>	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	<u>Limits</u>	Date Analyzed
Benzene	0.200 U	0.400	0.120	ug/L	1		08/14/19 19:16
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/16/19 15:18
Naphthalene	0.500 U	1.00	0.310	ug/L	1		08/14/19 19:16
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/16/19 15:18
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/16/19 15:18
Toluene	0.410 J	1.00	0.310	ug/L	1		08/16/19 15:18
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/16/19 15:18
Surrogates							
1,2-Dichloroethane-D4 (surr)	115	81-118		%	1		08/14/19 19:16
4-Bromofluorobenzene (surr)	104	85-114		%	1		08/14/19 19:16
Toluene-d8 (surr)	92.7	89-112		%	1		08/14/19 19:16

Batch Information

Analytical Batch: VMS19324 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/16/19 15:18 Container ID: 1199616010-A

Analytical Batch: VMS19308 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/14/19 19:16 Container ID: 1199616010-A Prep Batch: VXX34674 Prep Method: SW5030B Prep Date/Time: 08/16/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Prep Batch: VXX34653 Prep Method: SW5030B Prep Date/Time: 08/14/19 11:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:43:56AM

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Results of MW19-02 Client Sample ID: MW19-02 Client Project ID: 101752 Petro Star NPR Lab Sample ID: 1199616011 Lab Project ID: 1199616							
		Collection Date: 08/07/19 16:26 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:					
Results by Semivolatile Organic Fuel	S						
Parameter Diesel Range Organics	<u>Result Qual</u> 0.294 U	<u>LOQ/CL</u> 0.588	<u>DL</u> 0.176	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> Limits	Date Analyzec 08/20/19 09:04
Surrogates							
5a Androstane (surr)	95.8	50-150		%	1		08/20/19 09:0
Batch Information							
Analytical Batch: XFC15255 Analytical Method: AK102 Analyst: CMS Analytical Date/Time: 08/20/19 09:04 Container ID: 1199616011-G		Prep Batch: Prep Method Prep Date/Ti Prep Initial V Prep Extract					

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J flagging is activated

Results of MW19-02 Client Sample ID: MW19-02 Client Project ID: 101752 Petro Star NPR Lab Sample ID: 1199616011 Lab Project ID: 1199616		C R M S L					
Results by Volatile Fuels Parameter Gasoline Range Organics	<u>Result Qual</u> 0.0500 U	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> <u>Limits</u>	Date Analyzed 08/17/19 05:06
Surrogates 4-Bromofluorobenzene (surr) Batch Information	88.4	50-150		%	1		08/17/19 05:06
Analytical Batch: VFC14881 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/17/19 05:06 Container ID: 1199616011-D	Prep Batch: VXX34664 Prep Method: SW5030B Prep Date/Time: 08/16/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL						

J flagging is activated
Results of MW19-02

Client Sample ID: **MW19-02** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199616011 Lab Project ID: 1199616

Collection Date: 08/07/19 16:26 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	<u>Result Qual</u>	LOQ/CL	DL	<u>Units</u>	DF	<u>Limits</u>	Date Analyzed
Benzene	0.200 U	0.400	0.120	ug/L	1		08/14/19 19:32
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/14/19 19:32
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/16/19 15:34
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/16/19 15:34
Toluene	0.500 U	1.00	0.310	ug/L	1		08/16/19 15:34
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/16/19 15:34
Surrogates							
1,2-Dichloroethane-D4 (surr)	112	81-118		%	1		08/14/19 19:32
4-Bromofluorobenzene (surr)	105	85-114		%	1		08/14/19 19:32
Toluene-d8 (surr)	93.2	89-112		%	1		08/14/19 19:32

Batch Information

Analytical Batch: VMS19324 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/16/19 15:34 Container ID: 1199616011-A

Analytical Batch: VMS19308 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/14/19 19:32 Container ID: 1199616011-A Prep Batch: VXX34674 Prep Method: SW5030B Prep Date/Time: 08/16/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Prep Batch: VXX34653 Prep Method: SW5030B Prep Date/Time: 08/14/19 11:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:43:56AM

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Results of MW15-1 Client Sample ID: MW15-1 Client Project ID: 101752 Petro Star N Lab Sample ID: 1199616012 Lab Project ID: 1199616	IPR	C R M S L	ollection Da eceived Dat latrix: Water olids (%): ocation:	te: 08/07/ te: 08/09/⁻ (Surface,	19 11:11 19 09:51 Eff., Gro	l bund)	
Results by Volatile Fuels Parameter Gasoline Range Organics	<u>Result Qual</u> 0.0500 U	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> Limits	<u>Date Analyzed</u> 08/17/19 05:24
Surrogates 4-Bromofluorobenzene (surr)	93.7	50-150		%	1		08/17/19 05:24
Batch Information Analytical Batch: VFC14881 Analytical Method: AK101 Analyst: NRB Analytical Date/Time: 08/17/19 05:24 Container ID: 1199616012-D			Prep Batch: Prep Method: Prep Date/Tir Prep Initial W Prep Extract	VXX34664 : SW5030E ne: 08/16/ 't./Vol.: 5 m Vol: 5 mL	3 19 06:00 IL		

J flagging is activated

Results of MW15-1

SG

Client Sample ID: **MW15-1** Client Project ID: **101752 Petro Star NPR** Lab Sample ID: 1199616012 Lab Project ID: 1199616 Collection Date: 08/07/19 11:11 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	<u>Limits</u>	Date Analyzed
Benzene	0.200 U	0.400	0.120	ug/L	1		08/14/19 19:47
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/14/19 19:47
Naphthalene	0.500 U	1.00	0.310	ug/L	1		08/14/19 19:47
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/16/19 15:49
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/16/19 15:49
Toluene	0.500 U	1.00	0.310	ug/L	1		08/16/19 15:49
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/16/19 15:49
Surrogates							
1,2-Dichloroethane-D4 (surr)	112	81-118		%	1		08/14/19 19:47
4-Bromofluorobenzene (surr)	105	85-114		%	1		08/14/19 19:47
Toluene-d8 (surr)	92.3	89-112		%	1		08/14/19 19:47

Batch Information

Analytical Batch: VMS19324 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/16/19 15:49 Container ID: 1199616012-A

Analytical Batch: VMS19308 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/14/19 19:47 Container ID: 1199616012-A Prep Batch: VXX34674 Prep Method: SW5030B Prep Date/Time: 08/16/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Prep Batch: VXX34653 Prep Method: SW5030B Prep Date/Time: 08/14/19 11:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:43:56AM

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2	С					
	R M S L	ollection Da eceived Dat latrix: Water olids (%): ocation:	te: 08/07/ e: 08/09/ (Surface,	19 11:08 19 09:51 Eff., Grou	und)	
<u>Result Qual</u> 0.0500 U	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L	<u>DF</u> 1	<u>Allowable</u> Limits	<u>Date Analyze</u> 08/17/19 00:5
87.5	50-150		%	1		08/17/19 00:5
		Prep Batch: \ Prep Method: Prep Date/Tin Prep Initial W Prep Extract \	/XX34664 SW5030B ne: 08/16/1 t./Vol.: 5 m Vol: 5 mL) 19 06:00 IL		
	Result Qual 0.0500 U 87.5	Result Qual LOQ/CL 0.0500 U 0.100 87.5 50-150	Solids (%): Location: Result Qual LOQ/CL DL 0.0500 U 0.100 0.0310 87.5 50-150 Prep Batch: \ Prep Method: Prep Date/Tin Prep Initial W Prep Extract \	Solids (%): Location: Result Qual LOQ/CL DL Units 0.0500 U 0.100 0.0310 mg/L 87.5 50-150 % Prep Batch: VXX34664 Prep Method: SW5030B Prep Date/Time: 08/16/1 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL	Solids (%): Location: Result Qual LOQ/CL DL Units DF 0.0500 U 0.100 0.0310 mg/L 1 87.5 50-150 % 1 Prep Batch: VXX34664 Prep Method: SW5030B Prep Date/Time: 08/16/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL	Solids (%): Location: <u>Allowable</u> <u>Limits</u> 0.0500 U 0.100 0.0310 mg/L 1 87.5 50-150 % 1 Prep Batch: VXX34664 Prep Method: SW5030B Prep Date/Time: 08/16/19 06:00 Prep Initial Wt./Vol: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:43:56AM

J flagging is activated

Results of Trip Blank

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Client Sample ID: Trip Blank
Client Project ID: 101752 Petro Star NPR
Lab Sample ID: 1199616013
Lab Project ID: 1199616

Collection Date: 08/07/19 11:08 Received Date: 08/09/19 09:51 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	Limits	Date Analyzed
Benzene	0.200 U	0.400	0.120	ug/L	1		08/16/19 12:45
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		08/16/19 12:45
Naphthalene	0.500 U	1.00	0.310	ug/L	1		08/16/19 12:45
o-Xylene	0.500 U	1.00	0.310	ug/L	1		08/16/19 12:45
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		08/16/19 12:45
Toluene	0.500 U	1.00	0.310	ug/L	1		08/16/19 12:45
Xylenes (total)	1.50 U	3.00	1.00	ug/L	1		08/16/19 12:45
Surrogates							
1,2-Dichloroethane-D4 (surr)	114	81-118		%	1		08/16/19 12:45
4-Bromofluorobenzene (surr)	100	85-114		%	1		08/16/19 12:45
Toluene-d8 (surr)	93.2	89-112		%	1		08/16/19 12:45

Batch Information

Analytical Batch: VMS19324 Analytical Method: SW8260C Analyst: CMC Analytical Date/Time: 08/16/19 12:45 Container ID: 1199616013-A Prep Batch: VXX34674 Prep Method: SW5030B Prep Date/Time: 08/16/19 06:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:43:56AM

J flagging is activated

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Method Blank

Blank ID: MB for HBN 1797975 [VXX/34653] Blank Lab ID: 1525643 Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1199616001, 1199616002, 1199616003, 1199616004, 1199616005, 1199616008, 1199616009, 1199616010, 1199616011, 1199616012

Results by SW8260C

Parameter	Results	LOQ/CL	<u>DL</u>	<u>Units</u>
Benzene	0.200U	0.400	0.120	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
Naphthalene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	1.00	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	112	81-118		%
4-Bromofluorobenzene (surr)	103	85-114		%
Toluene-d8 (surr)	93.4	89-112		%

Batch Information

Analytical Batch: VMS19308 Analytical Method: SW8260C Instrument: Agilent 7890-75MS Analyst: CMC Analytical Date/Time: 8/14/2019 2:48:00PM Prep Batch: VXX34653 Prep Method: SW5030B Prep Date/Time: 8/14/2019 11:00:00AM Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:43:58AM



Blank Spike ID: LCS for HBN 1199616 [VXX34653] Blank Spike Lab ID: 1525644 Date Analyzed: 08/14/2019 15:03 Spike Duplicate ID: LCSD for HBN 1199616 [VXX34653] Spike Duplicate Lab ID: 1525645 Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1199616001, 1199616002, 1199616003, 1199616004, 1199616005, 1199616008, 1199616009, 1199616010, 1199616011, 1199616012

Results by SW8260C			_						
		Blank Spike	e (ug/L)	:	Spike Dupli	cate (ug/L)			
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>	<u>RPD (%)</u>	RPD CL
Benzene	30	27.2	91	30	26.5	88	(79-120)	2.50	(< 20)
Ethylbenzene	30	26.2	88	30	25.5	85	(79-121)	2.90	(< 20)
Naphthalene	30	26.2	87	30	28.3	94	(61-128)	7.60	(< 20)
o-Xylene	30	25.8	86	30	25.3	84	(78-122)	2.20	(< 20)
P & M -Xylene	60	54.1	90	60	52.6	88	(80-121)	2.70	(< 20)
Toluene	30	27.1	90	30	26.5	88	(80-121)	2.20	(< 20)
Xylenes (total)	90	79.9	89	90	77.9	87	(79-121)	2.60	(< 20)
Surrogates									
1,2-Dichloroethane-D4 (surr)	30	106	106	30	105	105	(81-118)	0.76	
4-Bromofluorobenzene (surr)	30	104	104	30	104	104	(85-114)	0.13	
Toluene-d8 (surr)	30	91.3	91	30	91.8	92	(89-112)	0.47	

Batch Information

Analytical Batch: VMS19308 Analytical Method: SW8260C Instrument: Agilent 7890-75MS Analyst: CMC Prep Batch: VXX34653 Prep Method: SW5030B Prep Date/Time: 08/14/2019 11:00 Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Print Date: 08/22/2019 8:44:00AM

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Method Blank

Blank ID: MB for HBN 1798067 [VXX/34664] Blank Lab ID: 1526014 Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1199616001, 1199616002, 1199616003, 1199616004, 1199616005, 1199616008, 1199616009, 1199616010, 1199616011, 1199616012, 1199616013

Results by AK101

Parameter Gasoline Range Organics Surrogates	<u>Results</u> 0.0500U	<u>LOQ/CL</u> 0.100	<u>DL</u> 0.0310	<u>Units</u> mg/L	
4-Bromofluorobenzene (surr)	87.6	50-150		%	
Batch Information					
Analytical Batch: VFC14881 Analytical Method: AK101 Instrument: Agilent 7890 PID Analyst: NRB Analytical Date/Time: 8/17/20	/FID 019 12:41:00AM	Prep B Prep M Prep D Prep Ir Prep E	atch: VXX34664 Aethod: SW5030B Date/Time: 8/16/20 hitial Wt./Vol.: 5 mL Extract Vol: 5 mL	19 6:00:00AM L	

Print Date: 08/22/2019 8:44:02AM



Blank Spike Summary									
Blank Spike ID: LCS for HBN Blank Spike Lab ID: 1526017 Date Analyzed: 08/16/2019	1199616 [15:26	VXX3466	4]	Spil [VX Spil Mat	ke Duplica X34664] ke Duplica rix: Wate	ate ID: LCS ate Lab ID: r (Surface,	D for HBN 1 1526018 Eff., Ground	199616)	
QC for Samples: 11996160 11996160	01, 119961 10, 119961	6002, 1199 6011, 1199	9616003, 119 9616012, 119	99616004, 99616013	119961600	05, 1199616	008, 1199616	009,	
Results by AK101									
	E	Blank Spike	e (mg/L)	S	pike Duplic	cate (mg/L)			
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>	<u>RPD (%)</u>	RPD CL
Gasoline Range Organics	1.00	1.01	101	1.00	1.04	104	(60-120)	2.40	(< 20)
Surrogates									
4-Bromofluorobenzene (surr)	0.0500	107	107	0.0500	99.2	99	(50-150)	7.80	
Batch Information									
Analytical Batch: VFC14881 Analytical Method: AK101 Instrument: Agilent 7890 PID/I Analyst: NRB	FID			Prep Prep Spik Dup	9 Batch: V. 9 Method: 9 Date/Time e Init Wt./v e Init Wt./v	8034664 SW5030B e: 08/16/201 /ol.: 1.00 mg	g/L Extract \ g/L Extract V	/ol: 5 mL ol: 5 mL	

Print Date: 08/22/2019 8:44:04AM

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Method Blank

Blank ID: MB for HBN 1798170 [VXX/34673] Blank Lab ID: 1526438 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199616006, 1199616007

Results by SW8260C

Parameter	<u>Results</u>	LOQ/CL	<u>DL</u>	<u>Units</u>
Benzene	0.200U	0.400	0.120	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	1.00	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	91.4	81-118		%
4-Bromofluorobenzene (surr)	96.7	85-114		%
Toluene-d8 (surr)	103	89-112		%

Batch Information

Analytical Batch: VMS19323 Analytical Method: SW8260C Instrument: VPA 780/5975 GC/MS Analyst: NRB Analytical Date/Time: 8/19/2019 1:04:00PM Prep Batch: VXX34673 Prep Method: SW5030B Prep Date/Time: 8/19/2019 6:00:00AM Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:44:05AM

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Leaching Blank

Blank ID: LB for HBN 1798021 [TCLP/10205 Blank Lab ID: 1525812

QC for Samples: 1199616006, 1199616007

Results by SW8260C

Parameter	<u>Results</u>	LOQ/CL	<u>DL</u>	<u>Units</u>
Benzene	8.44J	20.0	6.00	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	91.3	81-118		%
4-Bromofluorobenzene (surr)	97	85-114		%
Toluene-d8 (surr)	102	89-112		%

Batch Information

Analytical Batch: VMS19323 Analytical Method: SW8260C Instrument: VPA 780/5975 GC/MS Analyst: NRB Analytical Date/Time: 8/19/2019 4:54:00PM Prep Batch: VXX34673 Prep Method: SW5030B Prep Date/Time: 8/19/2019 6:00:00AM Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Matrix: Water (Surface, Eff., Ground)

Print Date: 08/22/2019 8:44:05AM



Blank Spike ID: LCS for HBN 1199616 [VXX34673] Blank Spike Lab ID: 1526439 Date Analyzed: 08/19/2019 13:19 Spike Duplicate ID: LCSD for HBN 1199616 [VXX34673] Spike Duplicate Lab ID: 1526440 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199616006, 1199616007

Results by SW8260C

		Blank Spike	e (ug/L)	:	Spike Dupli	cate (ug/L)			
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	CL	<u>RPD (%)</u>	RPD CL
Benzene	30	32.1	107	30	31.9	106	(79-120)	0.53	(< 20)
Ethylbenzene	30	31.1	104	30	31.1	104	(79-121)	0.00	(< 20)
o-Xylene	30	30.0	100	30	30.0	100	(78-122)	0.03	(< 20)
P & M -Xylene	60	62.7	104	60	62.6	104	(80-121)	0.09	(< 20)
Toluene	30	30.7	102	30	30.9	103	(80-121)	0.68	(< 20)
Xylenes (total)	90	92.7	103	90	92.6	103	(79-121)	0.05	(< 20)
Surrogates									
1,2-Dichloroethane-D4 (surr)	30	87.4	87	30	86.1	86	(81-118)	1.60	
4-Bromofluorobenzene (surr)	30	98.4	98	30	98.2	98	(85-114)	0.23	
Toluene-d8 (surr)	30	102	102	30	104	104	(89-112)	1.60	

Batch Information

Analytical Batch: VMS19323 Analytical Method: SW8260C Instrument: VPA 780/5975 GC/MS Analyst: NRB Prep Batch: VXX34673 Prep Method: SW5030B Prep Date/Time: 08/19/2019 06:00 Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Print Date: 08/22/2019 8:44:07AM



Method Blank

Blank ID: MB for HBN 1798173 [VXX/34674] Blank Lab ID: 1526441 Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1199616001, 1199616006, 1199616007, 1199616008, 1199616009, 1199616010, 1199616011, 1199616012, 1199616013

Results by SW8260C				
Parameter	Results	LOQ/CL	DL	<u>Units</u>
Benzene	0.200U	0.400	0.120	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
Naphthalene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	1.00	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	114	81-118		%
4-Bromofluorobenzene (surr)	101	85-114		%
Toluene-d8 (surr)	92.4	89-112		%

Batch Information

Analytical Batch: VMS19324 Analytical Method: SW8260C Instrument: Agilent 7890-75MS Analyst: CMC Analytical Date/Time: 8/16/2019 9:40:00AM Prep Batch: VXX34674 Prep Method: SW5030B Prep Date/Time: 8/16/2019 6:00:00AM Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:44:08AM



Blank Spike ID: LCS for HBN 1199616 [VXX34674] Blank Spike Lab ID: 1526442 Date Analyzed: 08/16/2019 09:55 Spike Duplicate ID: LCSD for HBN 1199616 [VXX34674] Spike Duplicate Lab ID: 1526443 Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1199616001, 1199616006, 1199616007, 1199616008, 1199616009, 1199616010, 1199616011, 1199616012, 1199616013

Results by SW8260C

		Blank Spike	e (ug/L)	:	Spike Dupli	cate (ug/L)			
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>	<u>RPD (%)</u>	RPD CL
Benzene	30	27.3	91	30	27.2	91	(79-120)	0.57	(< 20)
Ethylbenzene	30	26.3	88	30	25.8	86	(79-121)	1.90	(< 20)
Naphthalene	30	26.5	88	30	27.4	92	(61-128)	3.50	(< 20)
o-Xylene	30	25.6	86	30	25.5	85	(78-122)	0.64	(< 20)
P & M -Xylene	60	53.2	89	60	53.1	88	(80-121)	0.21	(< 20)
Toluene	30	27.1	90	30	26.8	89	(80-121)	1.30	(< 20)
Xylenes (total)	90	78.8	88	90	78.5	87	(79-121)	0.35	(< 20)
Surrogates									
1,2-Dichloroethane-D4 (surr)	30	107	107	30	107	107	(81-118)	0.03	
4-Bromofluorobenzene (surr)	30	100	100	30	102	102	(85-114)	1.90	
Toluene-d8 (surr)	30	92.9	93	30	92.4	92	(89-112)	0.52	

Batch Information

Analytical Batch: VMS19324 Analytical Method: SW8260C Instrument: Agilent 7890-75MS Analyst: CMC Prep Batch: VXX34674 Prep Method: SW5030B Prep Date/Time: 08/16/2019 06:00 Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

Print Date: 08/22/2019 8:44:09AM

SGS

Method Blank	
Blank ID: MB for HBN 1798211 [VXX/34681] Blank Lab ID: 1526606	Matrix: Water (Surface, Eff., Ground)
QC for Samples: 1199616006, 1199616007	
Results by AK101	
Parameter Results Gasoline Range Organics 0.0500U	<u>LOQ/CL</u> <u>DL</u> <u>Units</u> 0.100 0.0310 mg/L
Surrogates4-Bromofluorobenzene (surr)82.6	50-150 %
Batch Information	
Analytical Batch: VFC14884 Analytical Method: AK101 Instrument: Agilent 7890A PID/FID Analyst: NRB Analytical Date/Time: 8/19/2019 9:36:00PM	Prep Batch: VXX34681 Prep Method: SW5030B Prep Date/Time: 8/19/2019 6:00:00AM Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 08/22/2019 8:44:12AM



Blank Spike ID: LCS for HBN 1199616 [VXX34681] Blank Spike Lab ID: 1526607 Date Analyzed: 08/20/2019 03:31 Spike Duplicate ID: LCSD for HBN 1199616 [VXX34681] Spike Duplicate Lab ID: 1526608 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199616006, 1199616007

Results by AK101			_						
	E	Blank Spike	e (mg/L)	S	pike Duplic	cate (mg/L)			
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	CL	<u>RPD (%)</u>	RPD CL
Gasoline Range Organics	1.00	1.04	104	1.00	0.999	100	(60-120)	4.00	(< 20)
Surrogates									
4-Bromofluorobenzene (surr)	0.0500	85.8	86	0.0500	87.1	87	(50-150)	1.50	
Batch Information									
Analytical Batch: VFC14884				Prep	Batch: V	XX34681			
Analytical Method: AK101				Prep	Method:	SW5030B			
Instrument: Agilent 7890A Pl	D/FID			Prep	Date/Tim	e: 08/19/201	9 06:00		
Analyst: NRB				Spik	e Init Wt./\ o Init Wt./\	/ol.: 1.00 m(/ol.: 1.00 m(J/L Extract V	/01:5 mL	
				Dup		01 1.00 111g	יר באוומטו v	UL J IIL	

Print Date: 08/22/2019 8:44:13AM



Method Blank

Blank ID: MB for HBN 1797861 [XXX/42004] Blank Lab ID: 1525205 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199616001, 1199616003

Results by 8270D SIM LV (PAH)

<u>Parameter</u>	Results	LOQ/CL	DL	<u>Units</u>
1-Methylnaphthalene	0.0250U	0.0500	0.0150	ug/L
2-Methylnaphthalene	0.0250U	0.0500	0.0150	ug/L
Acenaphthene	0.0250U	0.0500	0.0150	ug/L
Acenaphthylene	0.0250U	0.0500	0.0150	ug/L
Anthracene	0.0250U	0.0500	0.0150	ug/L
Benzo(a)Anthracene	0.0250U	0.0500	0.0150	ug/L
Benzo[a]pyrene	0.0100U	0.0200	0.00620	ug/L
Benzo[b]Fluoranthene	0.0250U	0.0500	0.0150	ug/L
Benzo[g,h,i]perylene	0.0250U	0.0500	0.0150	ug/L
Benzo[k]fluoranthene	0.0250U	0.0500	0.0150	ug/L
Chrysene	0.0250U	0.0500	0.0150	ug/L
Dibenzo[a,h]anthracene	0.0100U	0.0200	0.00620	ug/L
Fluoranthene	0.0250U	0.0500	0.0150	ug/L
Fluorene	0.0250U	0.0500	0.0150	ug/L
Indeno[1,2,3-c,d] pyrene	0.0250U	0.0500	0.0150	ug/L
Naphthalene	0.0500U	0.100	0.0310	ug/L
Phenanthrene	0.0250U	0.0500	0.0150	ug/L
Pyrene	0.0250U	0.0500	0.0150	ug/L
Surrogates				
2-Methylnaphthalene-d10 (surr)	63.5	47-106		%
Fluoranthene-d10 (surr)	66.9	24-116		%

Batch Information

Analytical Batch: XMS11637 Analytical Method: 8270D SIM LV (PAH) Instrument: SVA Agilent 780/5975 GC/MS Analyst: DSD Analytical Date/Time: 8/15/2019 4:20:00PM Prep Batch: XXX42004 Prep Method: SW3520C Prep Date/Time: 8/14/2019 8:35:46AM Prep Initial Wt./Vol.: 250 mL Prep Extract Vol: 1 mL

Print Date: 08/22/2019 8:44:14AM

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Blank Spike ID: LCS for HBN 1199616 [XXX42004] Blank Spike Lab ID: 1525206 Date Analyzed: 08/15/2019 16:40 Spike Duplicate ID: LCSD for HBN 1199616 [XXX42004] Spike Duplicate Lab ID: 1525207 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199616001, 1199616002, 1199616003

Results by 8270D SIM LV (PAH)

	E	Blank Spike	e (ug/L)	Ś	Spike Dupli	cate (ug/L)			
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	CL	<u>RPD (%)</u>	RPD CL
1-Methylnaphthalene	2	1.38	69	2	1.50	75	(41-115)	7.80	(< 20)
2-Methylnaphthalene	2	1.38	69	2	1.49	74	(39-114)	7.80	(< 20)
Acenaphthene	2	1.33	66	2	1.45	72	(48-114)	8.70	(< 20)
Acenaphthylene	2	1.39	69	2	1.50	75	(35-121)	8.00	(< 20)
Anthracene	2	1.35	68	2	1.48	74	(53-119)	8.90	(< 20)
Benzo(a)Anthracene	2	1.32	66	2	1.43	72	(59-120)	8.10	(< 20)
Benzo[a]pyrene	2	1.25	62	2	1.34	67	(53-120)	7.20	(< 20)
Benzo[b]Fluoranthene	2	1.36	68	2	1.44	72	(53-126)	5.90	(< 20)
Benzo[g,h,i]perylene	2	1.09	54	2	1.19	60	(44-128)	9.10	(< 20)
Benzo[k]fluoranthene	2	1.37	68	2	1.48	74	(54-125)	8.20	(< 20)
Chrysene	2	1.40	70	2	1.52	76	(57-120)	8.00	(< 20)
Dibenzo[a,h]anthracene	2	0.996	50	2	1.09	55	(44-131)	9.20	(< 20)
Fluoranthene	2	1.42	71	2	1.55	78	(58-120)	9.00	(< 20)
Fluorene	2	1.37	69	2	1.49	74	(50-118)	8.00	(< 20)
Indeno[1,2,3-c,d] pyrene	2	1.24	62	2	1.34	67	(48-130)	7.80	(< 20)
Naphthalene	2	1.38	69	2	1.51	76	(43-114)	8.90	(< 20)
Phenanthrene	2	1.29	64	2	1.42	71	(53-115)	9.60	(< 20)
Pyrene	2	1.44	72	2	1.57	79	(53-121)	8.70	(< 20)
Surrogates									
2-Methylnaphthalene-d10 (surr)	2	62.8	63	2	68.3	68	(47-106)	8.40	
Fluoranthene-d10 (surr)	2	63.5	64	2	69.8	70	(24-116)	9.50	

Batch Information

Analytical Batch: XMS11637 Analytical Method: 8270D SIM LV (PAH) Instrument: SVA Agilent 780/5975 GC/MS Analyst: DSD Prep Batch: XXX42004 Prep Method: SW3520C Prep Date/Time: 08/14/2019 08:35 Spike Init Wt./Vol.: 2 ug/L Extract Vol: 1 mL Dupe Init Wt./Vol.: 2 ug/L Extract Vol: 1 mL

Print Date: 08/22/2019 8:44:17AM

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SGS

Blank ID: MB for HBN 179 Blank Lab ID: 1525958	8054 [XXX/42035]	Matrix	: Water (Surfa	ce, Eff., Ground)	
QC for Samples: 1199616001, 1199616002					
Results by AK102)			
Parameter	<u>Results</u>	LOQ/CL	<u>DL</u>	<u>Units</u>	
Diesel Range Organics	0.300U	0.600	0.180	mg/L	
	70 F	CO 400		0/	
Analytical Batch: XFC152 Analytical Batch: XFC152 Analytical Method: AK102 Instrument: Agilent 78908 Analyst: CMS Analytical Date/Time: 8/1	254 2 3 R 9/2019 12:37:00PM	Prep Bate Prep Met Prep Date Prep Initia Prep Extr	ch: XXX42035 hod: SW3520C e/Time: 8/17/20 al Wt./Vol.: 250 ract Vol: 1 mL	:)19 9:56:24AM mL	



Blank Spike ID: LCS for HBN 1199616 [XXX42035] Blank Spike Lab ID: 1525959 Date Analyzed: 08/19/2019 12:47 Spike Duplicate ID: LCSD for HBN 1199616 [XXX42035] Spike Duplicate Lab ID: 1525960 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199616001, 1199616002

Results by AK102									
		Blank Spike	e (mg/L)	5	Spike Duplie	cate (mg/L)			
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>	<u>RPD (%)</u>	RPD CL
Diesel Range Organics	20	18.6	93	20	19.1	95	(75-125)	2.50	(< 20)
Surrogates									
5a Androstane (surr)	0.4	94.6	95	0.4	100	100	(60-120)	5.80	
Batch Information									
Analytical Batch: XFC15254 Analytical Method: AK102 Instrument: Agilent 7890B R Analyst: CMS				Pre Pre Spil Dup	o Batch: X o Method: o Date/Tim ke Init Wt./\ oe Init Wt./\	XX42035 SW3520C e: 08/17/201 /ol.: 20 mg/l /ol.: 20 mg/l	9 09:56 L Extract Vo	ol: 1 mL : 1 mL	

Print Date: 08/22/2019 8:44:19AM

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and the second s	

Method Blank				
Blank ID: MB for HBN 179 Blank Lab ID: 1526033	8071 [XXX/42040]	Matrix	k: Water (Surfa	ce, Eff., Ground)
QC for Samples: 1199616003, 1199616009, 1	199616011			
Results by AK102				
Parameter	Results	LOQ/CL	DL	<u>Units</u>
Diesel Range Organics	0.300U	0.600	0.180	mg/L
Surrogates				
5a Androstane (surr)	87.8	60-120		%
atch Information				
Analytical Batch: XFC152	255	Prep Ba	tch: XXX42040	
Analytical Method: AK102	2	Prep Me	ethod: SW3520	C
Instrument: Agilent 7890	BR	Prep Da	ite/Time: 8/19/2	019 9:00:04AM
		Prep Ini	tract Vol: 1 ml	JIIL

Print Date: 08/22/2019 8:44:21AM



Blank Spike ID: LCS for HBN 1199616 [XXX42040] Blank Spike Lab ID: 1526034 Date Analyzed: 08/20/2019 08:25 Spike Duplicate ID: LCSD for HBN 1199616 [XXX42040] Spike Duplicate Lab ID: 1526035 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199616003, 1199616009, 1199616011

Results by AK102			_						
		Blank Spike	e (mg/L)	5	Spike Duplic	cate (mg/L)			
Parameter	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	<u>CL</u>	<u>RPD (%)</u>	RPD CL
Diesel Range Organics	20	18.6	93	20	18.8	94	(75-125)	1.10	(< 20)
Surrogates									
5a Androstane (surr)	0.4	96.1	96	0.4	97.3	97	(60-120)	1.30	
Batch Information									
Analytical Batch: XFC15255 Analytical Method: AK102 Instrument: Agilent 7890B R Analyst: CMS				Pre Pre Pre Spil	p Batch: X p Method: p Date/Time ke Init Wt./\	XX42040 SW3520C e: 08/19/201 /ol.: 20 mg/l	9 09:00 _ Extract Vo	ol: 1 mL	
				Dup	be Init Wt./V	/ol.: 20 mg/L	Extract Vol	: 1 mL	

Print Date: 08/22/2019 8:44:22AM





1199616

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No. 36081

e-Sample Receipt Form

000	e-Sam <u>ple I</u>	Receip	t Form				
262	SGS Workorder #:	1	19961	6		9961	
Rev	/iew Criteria	ndition (Yes	, No, N/A	Excep	<mark>tions Not</mark>	ed below	
Chain of	Custody / Temperature Requirem	ents	N/A	Exemption permi	itted if samp	ler hand carries/deliv	vers.
	Were Custody Seals intact? Note # & locat	ion Yes	1F, 1B				
	COC accompanied sample	es? Yes					
DOD: Were sa	amples received in COC corresponding cooler	rs? N/A					
Tomporati	N/A **Exemption permitted if chille	ed & colle	ected <8 hours a	igo, or for sample	s where chi		1030
remperatu		·)? Yes	Cooler ID:	1	<u>@</u>		000
If samples received without a t	emperature blank, the "cooler temperature" will be	┣━━			@		<u> </u>
ocumented instead & "COOLER TE	EMP" will be noted to the right. "ambient" or "chilled"	will	Cooler ID:		@	°C Therm. ID:	<u>_</u>
00110			Cooler ID:		@	°C Therm. ID:	-
*lf >6°	C, were samples collected <8 hours age)? N/A					<u> </u>
	If <0°C, were sample containers ice free	e? N/A					
Note: Identify containe	rs received at non-compliant temperatur	·					
	Jse form FS-0029 if more space is neede	e. ed.					
Holding Time / Do	ocumentation / Sample Condition Requir	rements	Note: Refer to for	m F-083 "Sample C	Juide" for spec	ific holding times.	
vv	ere samples received within holding time	e? Yes					
Do samples match COC	** (i.e.,sample IDs,dates/times collected	ל)? <mark>Yes</mark>					
**Note: If times diffe **Note: If sample information on co	er <1hr, record details & login per COC.	Information					
Were analytical requests cl	lear? (i.e., method is specified for analys	es Yes]				
with mul	tiple option for analysis (Ex: BTEX, Meta	ıls)	Ĩ				
			N/A	***Exemption per	rmitted for m	ietals (e.g,200.8/602	<u>0A).</u>
Were proper containers	s (type/mass/volume/preservative***)use/	d? Yes	DRO and PAH	received in 125	i mL contaii	ners (4 each).	
	Volatile / LL-Hg Require	ments					
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with sample	s? Yes					
Were all water VOA vials	s free of headspace (i.e., bubbles ≤ 6 mm	ו)? Yes					
Were all s	soil VOAs field extracted with MeOH+BF	B? N/A					
Note to Clier	nt: Any "No", answer above indicates non-con	npliance	with standard p	rocedures and m	ay impact da	ata quality.	
	Additional no	tes (if a	applicable):				
Sample date not given on	COC for all samples. All sample labe	els list d	date as 8/7/19.	. Logged in p	er contain	er labels. Sample	÷ 4
label time (1153) does not	match COC time (1253). Sample logg	lea in p	er COC.				

e-Sampl<u>e Receipt Form FBK</u>

000

202	SGS Workorder #:	1	1996	516	1	1996	9616		
Review Crit	eria	Condition (Yes,	, No, N/A	Exc	eptions No	ted below	,		
Chain of Custod	y / Temperature Requ	irements	Y	es Exemption pe	rmitted if sam	pler hand car	ries/delivers.		
Were Cus	stody Seals intact? Note # &	location N/A							
	COC accompanied s	amples? Yes							
DOD: Were samples rece	eived in COC corresponding	coolers? N/A							
	**Exemption permitted i	f chilled & colle	ected <8 hou	urs ago, or for sam	nples where ch	nilling is not re	equired		
Temperature blank of	compliant* (i.e., 0-6 °C aft	er CF)? Yes	Cooler ID:	1	@	5.5 °C Th	erm. ID: D23		
			Cooler ID:		@	°C Th	erm. ID:		
If samples received without a temperature to ocumented instead & "COOLER TEMP" will be	blank, the "cooler temperature" wi noted to the right. "ambient" or "c	ll be hilled" will	Cooler ID:		@	°C Th	erm. ID:		
be noted if neither	is available.		Cooler ID:		@	°C Th	erm. ID:		
*It >6°C, were s	amples collected <8 hour	s ago?	ļ						
	una comple containers in	a fra a D							
II <0°C, v	vere sample containers ic	e free ?							
Note: Identify containers receive	d at non-compliant tempe	ratura							
Use form F	S-0029 if more space is r	needed.							
Holding Time / Documenta	tion / Sample Condition R	lequirements	Note: Refe	r to form F-083 "S	Sample Guide"	for specific h	olding times.		
Do samples match COC** (i.e.,sa	mple IDs,dates/times coll	ected)? N/C	Į						
**Note: If times differ <1hr, re	ecord details & login per C	COC.							
Note: If sample information on containers diffe	rs from COC, SGS will default to	COC information							
Were samples in good condi	tion (no leaks/cracks/brea	akage)? Yes	ļ						
Vere analytical requests clear? (i.e.,	method is specified for a	nalyses							
with multiple optio	n for analysis (Ex: BTEX,	Metals)							
		Yes							
Were Thp Blanks (i.e., VOAs	s, LL-Hg) in cooler with sa	(mm)2 N/C							
Were all water VOA vials free of h	field extracted with MeOL								
For Push/Short Hold Time	was PUSH/Short HT ema	1+DFD? N/A							
For Rush/Short Hold Time,			uith stands		d may impact				
Note to Clienty Any "No	, answer above indicates no	on-compliance	with standa	rd procedures and	a may impact o	Jala quality.			
Note to Client: Any "No	·								
Note to Client: Any "No	Addition	al notes (if a	applicable):					
Note to Client: Any "No	Addition	al notes (if a	applicable	י. איז (7923				
SGS Profile #	Addition	al notes (if a	applicable): 33 ⁻	7923				



Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container</u> Condition	<u>Container Id</u>	<u>Preservative</u>	<u>Container</u> Condition
1199616001-A	HCL to pH < 2	ОК	1199616005-C	HCL to $pH < 2$	ОК
1199616001-В	HCL to pH < 2	ОК	1199616005-D	HCL to pH < 2	OK
1199616001-C	HCL to $pH < 2$	ОК	1199616005-E	HCL to pH < 2	OK
1199616001-D	HCL to $pH < 2$	ОК	1199616005-F	HCL to pH < 2	ОК
1199616001-E	HCL to pH < 2	ОК	1199616006-A	HCL to pH < 2	ОК
1199616001-F	HCL to pH < 2	ОК	1199616006-B	HCL to pH < 2	ОК
1199616001-G	HCL to $pH < 2$	ОК	1199616006-C	HCL to pH < 2	ОК
1199616001-H	HCL to $pH < 2$	ОК	1199616006-D	HCL to pH < 2	ОК
1199616001-I	HCL to $pH < 2$	ОК	1199616006-E	HCL to pH < 2	ОК
1199616001-J	HCL to pH < 2	ОК	1199616006-F	HCL to pH < 2	ОК
1199616001-K	No Preservative Required	ОК	1199616007-A	HCL to pH < 2	ОК
1199616001-L	No Preservative Required	ОК	1199616007-B	HCL to pH < 2	ОК
1199616001-M	No Preservative Required	ОК	1199616007-C	HCL to pH < 2	ОК
1199616001-N	No Preservative Required	ОК	1199616007-D	HCL to pH < 2	ОК
1199616002-A	HCL to pH < 2	ОК	1199616007-E	HCL to pH < 2	ОК
1199616002-В	HCL to pH < 2	ОК	1199616007-F	HCL to pH < 2	ОК
1199616002-C	HCL to pH < 2	ОК	1199616008-A	HCL to pH < 2	ОК
1199616002-D	HCL to $pH < 2$	ОК	1199616008-B	HCL to pH < 2	ОК
1199616002-E	HCL to pH < 2	ОК	1199616008-C	HCL to pH < 2	ОК
1199616002-F	HCL to pH < 2	ОК	1199616008-D	HCL to pH < 2	ОК
1199616002-G	HCL to pH < 2	ОК	1199616008-E	HCL to pH < 2	ОК
1199616002-H	HCL to pH < 2	ОК	1199616008-F	HCL to pH < 2	ОК
1199616002-I	HCL to pH < 2	ОК	1199616009-A	HCL to pH < 2	ОК
1199616002-J	HCL to pH < 2	ОК	1199616009-B	HCL to pH < 2	ОК
1199616002-K	No Preservative Required	ОК	1199616009-C	HCL to pH < 2	ОК
1199616002-L	No Preservative Required	ОК	1199616009-D	HCL to pH < 2	ОК
1199616002-M	No Preservative Required	ОК	1199616009-E	HCL to pH < 2	ОК
1199616002-N	No Preservative Required	ОК	1199616009-F	HCL to pH < 2	ОК
1199616003-A	HCL to $pH < 2$	ОК	1199616009-G	No Preservative Required	ок
1199616003-В	HCL to pH < 2	ОК	1199616009-H	No Preservative Required	ок
1199616003-C	HCL to pH < 2	ОК	1199616009-I	No Preservative Required	ок
1199616003-D	HCL to pH < 2	ОК	1199616009-J	No Preservative Required	і ок
1199616003-E	HCL to pH < 2	ОК	1199616010-A	HCL to $pH < 2$	ОК
1199616003-F	HCL to $pH < 2$	ОК	1199616010-B	HCL to pH < 2	OK
1199616003-G	HCL to $pH < 2$	ОК	1199616010-C	HCL to pH < 2	OK
1199616003-H	HCL to pH < 2	ОК	1199616010-D	HCL to pH < 2	ОК
1199616003-I	HCL to pH < 2	ОК	1199616010-E	HCL to $pH < 2$	ОК
1199616003-J	HCL to pH < 2	ОК	1199616010-F	HCL to $pH < 2$	ОК
1199616003-K	No Preservative Required	ОК	1199616011-A	HCL to $pH < 2$	ОК
1199616003-L	No Preservative Required	ОК	1199616011-B	HCL to pH < 2	OK
1199616003-M	No Preservative Required	ОК	1199616011-C	HCL to $pH < 2$	ОК
1199616003-N	No Preservative Required	ОК	1199616011-D	HCL to $pH < 2$	ОК
1199616004-A	HCL to pH < 2	ОК	1199616011-E	HCL to $pH < 2$	ОК
1199616004-B	HCL to $pH < 2$	ОК	1199616011-F	HCL to $pH < 2$	ОК
1199616004-C	HCL to $pH < 2$	ОК	1199616011-G	HCL to $pH < 2$	ОК
1199616004-D	HCL to $pH < 2$	ОК	1199616011-H	HCL to $pH < 2$	ОК
1199616004-E	HCL to $pH < 2$	ОК	1199616011-I	HCL to pH < 2	ОК
1199616004-F	HCL to $pH < 2$	ОК	1199616011-J	HCL to pH < 2	ОК
1199616005-A	HCL to $pH < 2$	ОК	1199616012-A	HCL to pH < 2	ОК
1199616005-B	HCL to $pH < 2$	ОК	1199616012-B	HCL to $pH < 2$	OK Page 63 of 64

<u>Container Id</u>	<u>Preservative</u>	Container Condition	<u>Container Id</u>	<u>Preservative</u>	<u>Container</u> Condition
1199616012-C	HCL to pH < 2	ОК			
1199616012-D	HCL to $pH < 2$	ОК			
1199616012-E	HCL to $pH < 2$	ОК			
1199616012-F	HCL to $pH < 2$	ОК			
1199616013-A	HCL to pH < 2	ОК			
1199616013-B	HCL to $pH < 2$	ОК			
1199616013-C	HCL to $pH < 2$	ОК			
1199616013-D	HCL to $pH < 2$	ОК			
1199616013-E	HCL to $pH < 2$	ОК			
1199616013-F	HCL to $pH < 2$	ОК			

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates than an inappropriate container was submitted.

OK - The container was received at an acceptable pH for the analysis requested.

BU - The container was received with headspace greater than 6mm.

DM - The container was received damaged.

 $\ensuremath{\mathsf{FR}}\xspace$ - The container was received frozen and not usable for Bacteria or BOD analyses.

IC - The container provided for microbiology analysis was not a laboratory-supplied, pre-sterilized container and therefore was not suitable for analysis.

NC- The container provided was not preserved or was under-preserved. The method does not allow for additional preservative added after collection.

PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

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1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

		• Yes	C No	Comments:
	b.	If the sa alternate	mples were transferre e laboratory, was the l	ed to another "network" laboratory or sub-contracted to an laboratory performing the analyses ADEC CS approved?
		C Yes	💽 No	Comments:
N/ by	A; a the	all analys ADEC C	es were performed by CSP for the requested	the SGS laboratory in Anchorage, AK. The laboratory is certifie analyses.
<u>Chai</u> ı	n of	Custody	<u>(CoC)</u>	
a.	Co	C inform	ation completed, sigr	ned, and dated (including released/received by)?
		• Yes	C No	Comments:
b.	Co	orrect Ana	lyses requested?	
		• Yes	C No	Comments:
Labo	rato	ry Sampl	e Receipt Documenta	ation
a.	Sa	mple/coo	ler temperature docur	mented and within range at receipt (0° to 6° C)?
		• Yes	C No	Comments:
h	Sa	mple pres	servation acceptable - lorinated Solvents, et	- acidified waters, Methanol preserved VOC soil (GRO, BTEX, c.)?
0.	Vc			

⊙ Yes ⊂ No Comments:

The laboratory noted that samples were received in good condition.

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

• Yes • No Comments:

The laboratory noted the DRO and PAH samples were received in 125ml containers. Samples were analyzed normally and there were no impacts to data quality or usability.

Additionally, the lab noted that the sample data was not given for all samples on the COC. All sample labels listed date as 8/7/19. Samples were logged in per the container labels. Sample MW15-4 label time (1153) did not match the time listed on the COC (1253). Samples were logged in per the COC. Data quality and usability was not affected.

e. Data quality or usability affected?

Comments:

The data quality and/or usability are not affected.

4. <u>Case Narrative</u>

a. Present and understandable?

• Yes • No

Comments:

b. Discrepancies, errors, or QC failures identified by the lab?

C Yes ⊙ No Comments:

No discrepancies, errors, or QC failures were noted.

c. Were all corrective actions documented?

C Yes ⊙ No Comments:

No corrective actions were documented in the case narrative.

d. What is the effect on data quality/usability according to the case narrative?

Comments:

The case narrative did not note any effect on data quality/usability.

5. <u>Samples Results</u>

a. Correct analyses performed/reported as requested on COC?

• Yes C No Comments:

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b. All applicable holding times met?

• Yes • No Comments:

- c. All soils reported on a dry weight basis?
 - C Yes ⊙ No Comments:

N/A; soil samples were not submitted with this work order.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

⊙ Yes ○ No Comments:

We compared the limits of detection (LOD) to the reported non-detect results to assess analytical sensitivity. The LOD for naphthalene exceeded ADEC groundwater cleanup levels in project sample *MW19-103*, a field duplicate sample of *MW19-03*. Naphthalene was detected above ADEC groundwater cleanup levels in sample *MW19-03*. The naphthalene result for sample *MW19-03* will be used to evaluate the contaminant concentration at the location.

e. Data quality or usability affected?

• Yes C No Comments:

We cannot assess if naphthalene was present in sample *MW19-103* at a concentration below the laboratory detection limit (DL). The affected result is noted on the analytical results table.

6. QC Samples

- a. Method Blank
 - i. One method blank reported per matrix, analysis and 20 samples?

 Yes
 No
 Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

• Yes C No Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; target analytes were not detected in the method blank samples associated with this work order.

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

© Yes ⊙ No Comments:

N/A; no samples are affected.

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

- b. Laboratory Control Sample/Duplicate (LCS/LCSD)
 - i. Organics One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

• Yes C No Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

C Yes ⊙ No Comments:

Metal/inorganic analyses were not requested with this work order.

- iii. Accuracy All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)
- Yes No Comments:
- iv. Precision All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)
- Yes C No Comments:
- v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

N/A; see above.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

• Yes C No

Comments:

No; see above.

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vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and/or usability was not affected; see above.

- c. Surrogates Organics Only
 - i. Are surrogate recoveries reported for organic analyses field, QC and laboratory samples?
 - Yes No Comments:
 - Accuracy All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

• Yes C No Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

C Yes	💽 No	Comments

N/A; surrogate recoveries were within acceptable criteria.

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

- d. Trip blank Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): <u>Water and</u> <u>Soil</u>
 - i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples?

(If not, enter explanation below.)

• Yes • No Comments:

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

⊙ Yes C No Com

Comments:

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iii. A	All results	less than	LOQ?
--------	-------------	-----------	------

• Yes • No

Comments:

iv. If above LOQ, what samples are affected?

Comments:

NI/A.	thora		-	datastiana	:	the	trin	hlowly
1N/A,	uncre	were	по	ucicciions	ш	unc	uip	Ulalik

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

- e. Field Duplicate
 - i. One field duplicate submitted per matrix, analysis and 10 project samples?

C Yes 💿 No

Comments:

A field duplicate was not submitted for the naphthalene analysis by method EPA 8260.

ii. Submitted blind to lab?

• Yes O No Comments:

The sample *MW19-101* is a field-duplicate of sample *MW19-01*. The sample *MW19-103* is a field-duplicate of sample *MW19-03*.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil) RPD (%) = Absolute value of: $\frac{(R_1-R_2)}{((R_1+R_2)/2)} \ge 100$

> Where R_1 = Sample Concentration R_2 = Field Duplicate Concentration

🗘 Yes 🛛 💿 No

Comments:

The RPD for DRO exceeded 30% for field duplicate pair *MW19-01 / MW19-101*. The DRO results for theses samples are considered estimated and have been flagged J* in the analytical results table.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

The DRO results for sample *MW19-101* and *MW19-01* are considered estimated and have been flagged J* in the analytical results table.

f. Decontamination or Equipment Blank (If not applicable, a comment stating why must be entered below).

• Yes • No • Not Applicable

Sample *EB19-01* was submitted as an equipment blank. The submersible pump used to collect *EB19-01* was also used to collect the following samples in the listed order: *MW19-04*, *MW19-03*, *MW19-103*, *MW19-103*, *MW19-01*, *MW19-101*, and *EB19-01*.

i. All results less than LOQ?

C Yes ⊙ No Comments:

1-methylnaphthalene, naphthalene (by method EPA 8270), GRO, p&m-xylenes, and total xylenes were detected below the LOQ in the equipment blank.

2-methylnaphthalene, benzene, ethylbenzene, naphthalene (by EPA method 8260), o-xylene, and toluene were detected above the LOQ in the equipment blank.

ii. If above LOQ, what samples are affected?

Comments:

We assessed the effect of the equipment blank detections on the following samples: *MW19-04*, *MW19-03*, *MW19-103*, *MW15-4*, *MW19-01*, and *MW19-101*.

iii. Data quality or usability affected?

Comments:

Several analytes were detected in project samples *MW19-03*, *MW19-103*, *MW19-01*, and *MW19-101* at concentrations greater than ten times the equipment blank detections. We consider these results unaffected.

Toluene in sample MW19-04 and benzene, ethylbenzene, and GRO in sample MW15-4 were detected below the LOQs. We consider these results not-detected at the LOQ due to the equipment blank detection and have flagged the results B* in the analytical data table.

o-Xylene, p&m-xylenes, toluene, and total xylenes in sample *MW15-4*, and benzene in samples *MW19-01* and *MW19-101* were detected at concentrations above the LOQ but less than five times the equipment blank detection. We consider these results not-detected at the reported concentration due to the equipment blank detection and have flagged the results B* in the analytical data table.

Toluene in samples *MW19-01* and *MW19-101* was detected at concentrations greater than five times, but less than ten times, the equipment blank detection. We consider these results estimated, biased high, and have flagged the results JH* in the analytical data table.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

- a. Defined and appropriate?
 - C Yes ⊙ No Comments:

Additional data flags or qualifiers are not required.

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Appendix E

Conceptual Site Model Scoping and Graphic Forms

Appendix A - Human Health Conceptual Site Model Scoping Form and Standardized Graphic

Site Name:	Petro Star Refinery - ULSD Spill
File Number:	100.38.102
Completed by:	Audrey Freeman

Introduction

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

General Instructions: Follow the italicized instructions in each section below.

1. General Information:

Sources (check potential sources at the site)

🗌 USTs	Vehicles
☐ ASTs	☐ Landfills
Dispensers/fuel loading racks	Transformers
Drums	\boxtimes Other: The ULSD contamination source was a gasket failure that released approximately 1,400 gallons of ULSD.

Release Mechanisms (check potential release mechanisms at the site)

⊠ Spills	Direct discharge
🗵 Leaks	Burning
	Other:

Impacted Media (check potentially-impacted media at the site)

⊠ Surface soil (0-2 feet bgs*)	⊠ Groundwater
Subsurface soil (>2 feet bgs)	Surface water
🖂 Air	Biota
Sediment	Other:

Receptors (check receptors that could be affected by contamination at the site)

- \boxtimes Commercial or industrial worker
- \boxtimes Construction worker
- Subsistence harvester (i.e. gathers wild foods)
- Subsistence consumer (i.e. eats wild foods)
- Farmer

 \boxtimes Site visitor

 \boxtimes Trespasser

Recreational user

 \Box Other:

^{*} bgs - below ground surface

- **2. Exposure Pathways:** (*The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".*)
- a) Direct Contact -
 - 1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.)

If the box is checked, label this pathway complete:	Complete	
Comments:		
Contaminants are present in soil between 0 and 15 feet below ground permeate skin. Incidental soil ingestion of contaminants is a complete and future site receptors. Site workers and visitors are expected to we avoid exposure.	d surface (bgs) and PAHs may e exposure pathway for current ear gloves and wash hands to +	
2. Dermal Absorption of Contaminants from Soil		
Are contaminants present or potentially present in surface so (Contamination at deeper depths may require evaluation on a	il between 0 and 15 feet below th a site specific basis.)	e ground surfac
Can the soil contaminants permeate the skin (see Appendix I	B in the guidance document)?	X
If both boxes are checked, label this pathway complete:	Complete	
Comments:		
Contaminants are present in soil between 0 and 15 feet bgs and PAHs absorption of contaminants from soil is a complete exposure pathway receptors. Site workers and visitors are expected to wear gloves and v	s may permeate skin. Dermal y for current and future site vash hands to avoid exposure.	
Ingestion - 1. Ingestion of Groundwater		
Have contaminants been detected or are they expected to be or are contaminants expected to migrate to groundwater in the	detected in the groundwater, ne future?	X
Could the potentially affected groundwater be used as a curr source? Please note, only leave the box unchecked if DEC has water is not a currently or reasonably expected future source to 18 AAC 75.350.	ent or future drinking water as determined the ground- of drinking water according	$\overline{\times}$
If both boxes are checked, label this pathway complete:	Complete	
Comments:		

+

supply is sourced by City of North Pole water supply. Exposure to groundwater is unlikely for current

2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future?

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities).

	Incomplete
Comments:	
3. Ingestion of Wild and Farmed Foods	
Is the site in an area that is used or reasonably could be used for harvesting of wild or farmed foods?	hunting, fishing, or
Do the site contaminants have the potential to bioaccumulate (sed document)?	ee Appendix C in the guidance
Are site contaminants located where they would have the potent biota? (i.e. soil within the root zone for plants or burrowing dep groundwater that could be connected to surface water, etc.)	tial to be taken up into oth for animals, in
If all of the boxes are checked, label this pathway complete:	Incomplete
Comments:	
Comments:	
Comments:	
Comments: nhalation- 1. Inhalation of Outdoor Air	
Comments: nhalation- 1. Inhalation of Outdoor Air Are contaminants present or potentially present in surface soil b ground surface? (Contamination at deeper depths may require e	between 0 and 15 feet below the evaluation on a site specific basis.)
Comments: nhalation- 1. Inhalation of Outdoor Air Are contaminants present or potentially present in surface soil b ground surface? (Contamination at deeper depths may require of Are the contaminants in soil volatile (see Appendix D in the g	between 0 and 15 feet below the evaluation on a site specific basis.)
Comments: nhalation- 1. Inhalation of Outdoor Air Are contaminants present or potentially present in surface soil b ground surface? (Contamination at deeper depths may require of Are the contaminants in soil volatile (see Appendix D in the g <i>If both boxes are checked, label this pathway complete:</i>	between 0 and 15 feet below the evaluation on a site specific basis.) guidance document)?

 \square

 \square

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminted soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures)

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)?

If both boxes are checked, label this pathway complete:

Incomplete

Comments:

The FSII building is the only structure located within 30 horizontal or vertical feet of identified contamination and is not permanently occupied. Background sources of volatile petroleum constituents are likely in the FSII building due to normal operations, complicating an assessment of vapor intrusion. The refinery's administrative and engineering controls are protective of worker safety.

 \square

3. Additional Exposure Pathways: (Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)

Dermal Exposure to Contaminants in Groundwater and Surface Water

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- Climate permits recreational use of waters for swimming.
- Climate permits exposure to groundwater during activities, such as construction.
- o Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are deemed protective of this pathway because dermal absorption is incorporated into the groundwater exposure equation for residential uses.

Check the box if further evaluation of this pathway is needed:

Comments:

Exposure to groundwater may occur during activities, such as construction. Dermal absorption of contaminants in groundwater is a complete exposure pathway for current and future site receptors. Site workers and visitors are expected to wear gloves and wash hands to avoid exposure.

Inhalation of Volatile Compounds in Tap Water

Inhalation of volatile compounds in tap water may be a complete pathway if:

- The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

DEC groundwater cleanup levels in 18 AAC 75, Table C are protective of this pathway because the inhalation of vapors during normal household activities is incorporated into the groundwater exposure equation.

Check the box if further evaluation of this pathway is needed:

Comments:

Petro Star's on-site water supply is sourced by City of North Pole water supply.

 \square

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Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter PM₁₀). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.

DEC human health soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because the inhalation of particulates is incorporated into the soil exposure equation.

Check the box if further evaluation of this pathway is needed:

Comments:

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

Check the box if further evaluation of this pathway is needed:

Comments:

4. Other Comments (*Provide other comments as necessary to support the information provided in this form.*)

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: Petro Star Refinery - ULSD Spill

<u>Instructions</u>: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.

Date Completed: January 16, 2020 (5) Image: Completed: January 16, 2020 (6) Check at media data and the fill of the f	Completed I	By: Audrey Freeman			use controls when describing pair	iways	•						
(1) (2) Chock the indiced putticeture by the rolesses. For example, chock on production (r), bittlers the generative and role does not produce the indice of the chock on (r) if the media date as a secondary source. (3) (4) Media Transport Mechanisms Chock data indice data (r), bittlers the generative data (r), bittlers the indice data (r), bittlers the generative data (r), bittlers the indice data (r), bittlers the generative data (r), bittlers the indice data (r), bittlers the generative data (r), bittlers the indice data (r), bittlers the generative data (r), bittlers the indice data (r), bittlers the generative data (r), bittlers the indice data (r), bittlers the generative data (r), bittlers the indice data (r), bittlers the generative data (r), bittlers the indice data (r), bittlers the generative data (r), bittlers the	Date Compl	leted: January 16, 2020								(5)			
(1) (2) (3) (4) Total intermediation in the construction in the particulation in the p	, , ,					lden expo "F" fo	tify the osure p or futui	recep athwa e rece	tors po y: Ente ptors,	tentially er "C" for "C/F" for	affecte currer both (ed by nt rece currer	each eptors nt and
Check as represented to the field and (f), 100 where the considered and (f),	(1)	(2)	(3)		(4)	futur	re rece _l	otors,	or "I" fo	or insigni	ficant	expos	sure.
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		Uptake by plants or animals <u>check biota</u>	D biota	Inges	tion of Wild or Farmed Foods								

Revised, 10/01/2010

Appendix A - Human Health Conceptual Site Model Scoping Form and Standardized Graphic

Site Name:	Petro Star Refinery - Gasoline Spill
File Number:	100.38.102
Completed by:	Audrey Freeman

Introduction

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

General Instructions: Follow the italicized instructions in each section below.

1. General Information:

Sources (check potential sources at the site)

USTs	□ Vehicles
⊠ ASTs	□ Landfills
Dispensers/fuel loading racks	Transformers
Drums	Other:
Release Mechanisms (check potential release mecha	nisms at the site)
⊠ Spills	□ Direct discharge
□ Leaks	Burning
	Other:
Impacted Media (check potentially-impacted media	at the site)
\boxtimes Surface soil (0-2 feet bgs*)	⊠ Groundwater
Subsurface soil (>2 feet bgs)	Surface water
🖂 Air	🗌 Biota
☐ Sediment	Other:
Receptors (check receptors that could be affected by	contamination at the site)
Residents (adult or child)	⊠ Site visitor

- $\overline{\boxtimes}$ Commercial or industrial worker
- $\overline{\times}$ Construction worker
- Subsistence harvester (i.e. gathers wild foods)
- Subsistence consumer (i.e. eats wild foods)
- ☐ Farmer

 \boxtimes Trespasser

Recreational user

□ Other:

^{*} bgs - below ground surface

- **2. Exposure Pathways:** (*The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".*)
- a) Direct Contact -
 - 1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.)

If the box is checked, label this pathway complete:	Complete	
Comments:		
Contaminants are present in soil between 0 and 15 feet below ground permeate skin. Incidental soil ingestion of contaminants from soil is a current and future site receptors. Site workers and site visitors are exp hands to avoid exposure.	l surface (bgs) and PAHs may complete exposure pathway for ected to wear gloves and wash +	
2. Dermal Absorption of Contaminants from Soil		
Are contaminants present or potentially present in surface so (Contamination at deeper depths may require evaluation on a	il between 0 and 15 feet below th site specific basis.)	the ground surface $\overline{\times}$
Can the soil contaminants permeate the skin (see Appendix E	in the guidance document)?	$\overline{\times}$
If both boxes are checked, label this pathway complete:	Complete	
Comments:		
Contaminants are present in soil between 0 and 15 feet bgs and PAHs absorption of contaminants from soil is a complete exposure pathway receptors. Site workers and site visitors are expected to wear gloves ar	may permeate the skin. Dermal for current and future site nd wash hands to avoid exposure.	
ngestion - 1. Ingestion of Groundwater		
Have contaminants been detected or are they expected to be or are contaminants expected to migrate to groundwater in th	detected in the groundwater, e future?	X
Could the potentially affected groundwater be used as a curre source? Please note, only leave the box unchecked if DEC ha water is not a currently or reasonably expected future source to 18 AAC 75.350.	ent or future drinking water as determined the ground- of drinking water according	X
If both boxes are checked, label this pathway complete:	Complete	
Commonto		

water source; however, ADEC has not determined the groundwater is not a future source of drinking water per 18 AAC 17.350. Petro Star's on-site water supply is sourced by City of North Pole water supply. Exposure to groundwater is unlikely for current and future site receptors.

2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future?

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities).

	Incomplete
Comments:	
3. Ingestion of Wild and Farmed Foods	
Is the site in an area that is used or reasonably could be used for harvesting of wild or farmed foods?	hunting, fishing, or
Do the site contaminants have the potential to bioaccumulate (sed document)?	ee Appendix C in the guidance
Are site contaminants located where they would have the potent biota? (i.e. soil within the root zone for plants or burrowing dep groundwater that could be connected to surface water, etc.)	tial to be taken up into oth for animals, in
If all of the boxes are checked, label this pathway complete:	Incomplete
Comments:	
Comments:	
Comments:	
Comments: nhalation- 1. Inhalation of Outdoor Air	
Comments: nhalation- 1. Inhalation of Outdoor Air Are contaminants present or potentially present in surface soil b ground surface? (Contamination at deeper depths may require e	between 0 and 15 feet below the evaluation on a site specific basis.)
Comments: nhalation- 1. Inhalation of Outdoor Air Are contaminants present or potentially present in surface soil b ground surface? (Contamination at deeper depths may require of Are the contaminants in soil volatile (see Appendix D in the g	between 0 and 15 feet below the evaluation on a site specific basis.)
Comments: nhalation- 1. Inhalation of Outdoor Air Are contaminants present or potentially present in surface soil b ground surface? (Contamination at deeper depths may require of Are the contaminants in soil volatile (see Appendix D in the g <i>If both boxes are checked, label this pathway complete:</i>	between 0 and 15 feet below the evaluation on a site specific basis.) guidance document)?

 \square

 \square

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminted soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures)

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)?

If both boxes are checked, label this pathway complete:

Incomplete

Comments:

 \times

 \square

3. Additional Exposure Pathways: (Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)

Dermal Exposure to Contaminants in Groundwater and Surface Water

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- Climate permits recreational use of waters for swimming.
- Climate permits exposure to groundwater during activities, such as construction.
- o Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are deemed protective of this pathway because dermal absorption is incorporated into the groundwater exposure equation for residential uses.

Check the box if further evaluation of this pathway is needed:

Comments:

Exposure to groundwater may occur during activities, such as construction. Dermal absorption of contaminants in groundwater is a complete exposure pathway for current and future site receptors. Site workers and visitors are expected to wear gloves and wash hands to avoid exposure.

Inhalation of Volatile Compounds in Tap Water

Inhalation of volatile compounds in tap water may be a complete pathway if:

- The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

DEC groundwater cleanup levels in 18 AAC 75, Table C are protective of this pathway because the inhalation of vapors during normal household activities is incorporated into the groundwater exposure equation.

Check the box if further evaluation of this pathway is needed:

Comments:

Petro Star's on-site water supply is sourced by City of North Pole water supply.

 \square

 $\overline{\times}$

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter PM₁₀). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.

DEC human health soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because the inhalation of particulates is incorporated into the soil exposure equation.

Check the box if further evaluation of this pathway is needed:

Comments:

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

Check the box if further evaluation of this pathway is needed:

Comments:

4. Other Comments (*Provide other comments as necessary to support the information provided in this form.*)

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: Petro Star Refinery - ULSD Spill

<u>Instructions</u>: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.

Completed By: Audrey Freeman Date Completed: January 13, 2020		use controls when describing pathways.											
										(5)		
							Identii expos	fy the re ure pat	ecepto hway:	rs pot Enter	entially "C" for	affecte current	d by each receptors
(1) (2)		(3) (4)				"F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.							
Check the media that could be directly affected by the release.For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.		Check all exposure media identified in (2).		2).	Check all pathways that could be complete. The pathways identified in this column must agree with Sections 2 and 3 of the Human Health CSM Scoping Form.		Cı /	irrer /	nt &	Fut			eptors
Media	Transport Mechanisms	Exposi	ure Me	edia	Exposure Pathway/Rou	ute		(ren)	espa	user /	bsiste	usuc	
Image: Source of the sector	ase to surface soil check soil on to subsurface check soil on to groundwater check groundwater zation check air					/	Residents (adults or chill	Commercial or industrial work	or recreationa	Construction w	Farmers or sul	Subsistence co	Other
Runoff	or erosion check surface water		N	✓ Incide	ntal Soil Ingestion		0	C/F C	/F C	;/F (C/F		
	by plants or animals <u>check biota</u>	🔽 so	il 👘	🗸 🗸 🗸	al Absorption of Contaminants from	ı Soil	0	C/F C	/F C)/F	C/F		
			V	🗌 Inhala	tion of Fugitive Dust								
	ase to subsurface soil check soil												
Subsurface Vingrati	check ar		N	✓ Ingest	ion of Groundwater		0	C/F C	C/F C	:/F	C/F		
(2-15 ft bgs) Uptake	Uptake by plants or animals check biota		dwater	🗸 Derma	al Absorption of Contaminants in G	roundwater		C/F C)/F (C/F	C/F		
Other (list):		/	Inhala	tion of Volatile Compounds in Tap	Water							
Direct rele	ase to groundwater check groundwater					·							
Ground- Volatiliz	zation check air		N	🗸 Inhala	tion of Outdoor Air		(C/F C	;/F C	;/F			
water	Flow to sediment	🔽 ai	air	📄 Inhala	alation of Indoor Air								
	by plants or animals <u>check biota</u>		V	🗌 Inhala	tion of Fugitive Dust								
Other (, , , , , , , , , , , , , , , , , , ,					I							
Direct rel	ease to surface water check surface water		N	Ingest	ion of Surface Water								
Surface Volatiliz	Volatilization <u>check air</u>	🔲 surfac	e water	🗌 Derma	Dermal Absorption of Contaminants in Surface Water								
Water Sedime	entation check sediment		V	🗌 Inhala	tion of Volatile Compounds in Tap	Water							
Other (list):		N				i				·		
		🗖 sedin	nent	Direct	Contact with Sediment								
	Dension, runoff, or erosion check surface water												
Uptake	by plants or animals	🗖 bio	ta	Ingest	ion of Wild or Farmed Foods								

Revised, 10/01/2010

IMPORTANT INFORMATION

Important Information

About Your Geotechnical/Environmental Report

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors that were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining

your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims

being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland